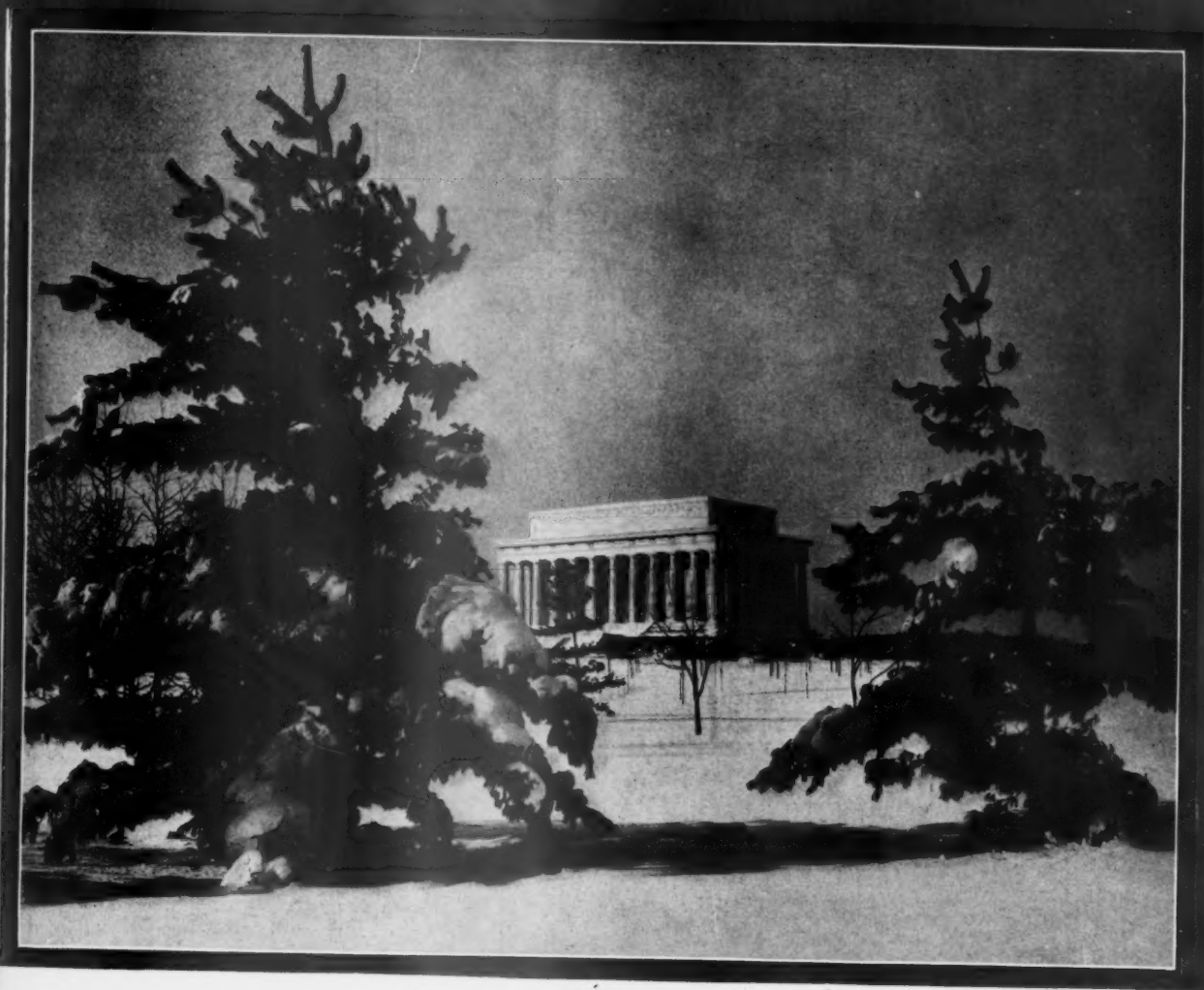
The MINING CONGRESS JOURNAL



Lincoln Memorial at Washington, D. C.

DECEMBER, 1934

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IN THIS ISSUE

The special feature of this issue will be a 44-page form devoted to economic importance of minerals to the nation. It will present a symposium showing number of mines—men employed—wages paid—equipment purchased—taxes paid for the following: coal—copper—lead and zinc—iron—gold—silver—sand and gravel—petroleum—gas—sulphur. This data has never before been presented.

MARCH
1935

IN THIS ISSUE

A 32-page form devoted to mining methods, practice and equipment in Bituminous and Anthracite, featuring the May Convention and Exposition.

MAY
1935

IN THIS ISSUE

A 32-page form devoted to the efficient use of various types of equipment written by manufacturers. Profusely illustrated with different types of equipment and mines.

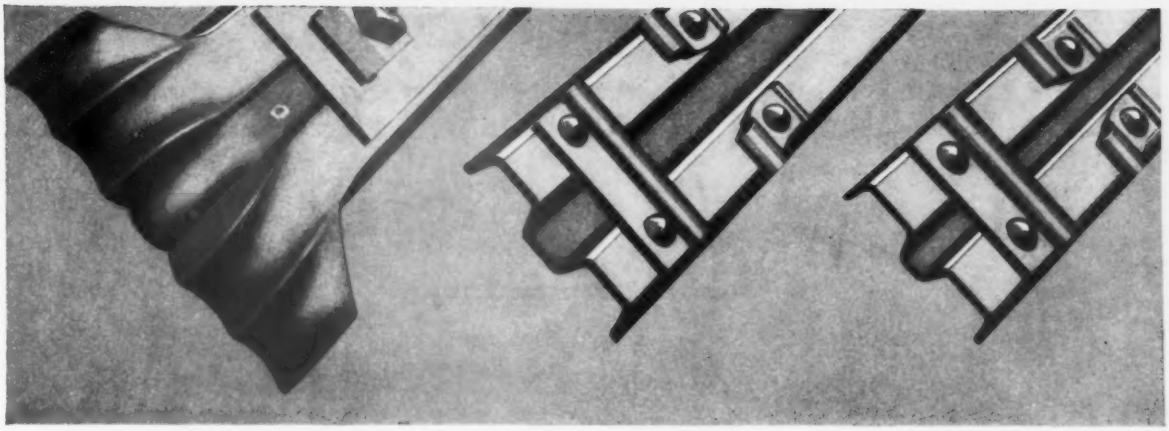
JULY
1935

IN THIS ISSUE

A 32-page form devoted to the problems of metal industries, particularly the non-ferrous group. Featuring the Convention and Exposition of the Western Division, The American Mining Congress.

OCTOBER
1935

The 4 issues depicted here will serve to give you some idea of the outline for the 1935 Mining Congress Journal. The editor has prepared an outline of contents for the entire year which is yours for the asking. As has always been the custom all issues for the year will contain feature articles by men prominent in the various branches of the mining industry thus insuring wider reader interest and offering a tremendous market for the sale of your product.



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The MINING CONGRESS JOURNAL

DECEMBER 1934

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WE DO OUR PART

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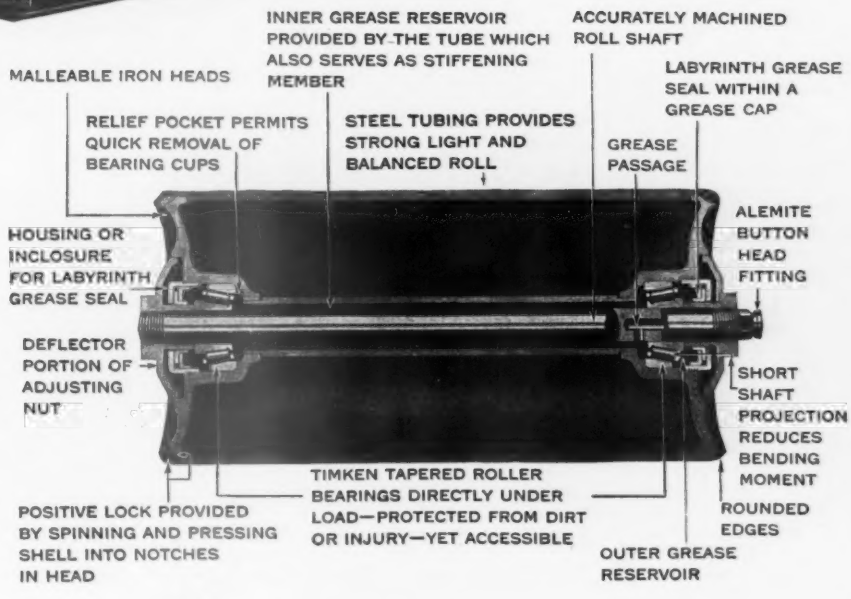
BELT CONVEYORS

Cross-sectional view of Type 40 Roll.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Right-About Face—Forward

THE GREATEST SUCCESSES have been made out of a lot of mistakes that have been corrected.

The country will hail with delight the apparent determination of the Administration to change from failing experiments to a new order more nearly in accord with policies thoroughly and successfully tested in the past.

The progress of the past has been based upon the self-directed efforts of the millions of individuals, each working for the success of his individual enterprise and each dependent upon his own efforts.

The total of a million successful small enterprises was the solid base upon which mass production and big business predicated its success. Costs were kept low enough to control local markets and high enough to provide fair wages for local workmen who in turn were able to consume a large part of domestic production.

It is the duty of government to protect every man willing to work in an opportunity to earn a living. Having created that opportunity it would seem that the responsibilities of the Government in this respect had come to an end. The payment of relief wages, in excess of the amount which the industries in the particular community can pay, leads directly to the stagnation of business and increased requirement for Government aid.

The vast increase of those expecting and demanding Government relief seems to prove that there are many individuals ready to sacrifice their independence as proper compensation for living without work. Secretary of Commerce Roper has recently taken occasion "to warn against the creation of a leisure class composed of those who prefer relief work to the low pay of private jobs."

It is not the cost of this relief which destroys public business confidence. Any country with an average earning of fifty billions of dollars can quickly and without great hardship provide for an indebtedness of a few billions of dollars. The great danger consists in the breaking down of the morale of the American workman.

And it is most gratifying to find that Government officials, in close contact with these matters, have awakened to these facts. Let us listen to Mr. Hopkins, of the Relief Administration:

> *"I know of no one who is at all familiar with the problems of unemployment relief who believes that the present system should be continued a day longer than is necessary—not because it is a waste of public funds, but, rather, that it is a tragic waste of human values, and a totally un-American way of meeting a problem. A method must, and will, be found to provide a way of life for millions of these people that will assure them the opportunity for earning an income which will provide a decent standard of living."*

During national emergencies every man who is willing and able to work should be provided with some employment, no matter how foolish or useless, through which he may earn not standard wages but just sufficient to prevent hunger and want. Government offers should never exceed three-fourths of the lowest average wage paid by the industries in any given community. That men should refuse a subsistence wage and accept Government relief creates an intolerable situation and an unbearable burden upon local industry.

Mr. Donald Richberg in his address before the New England Economic Council at Boston, Mass., pointed out very clearly the dangers which we have been rapidly approaching. Mr. Richberg said:

> *"But in such relief measures there is no constructive solution of our major problem. On the contrary, the pauperization of millions of people would effectuate, not only a disintegration of their moral fibre and their capacity for self-support, but also a mobilization of discontent that would inevitably lead to civil disorder."*

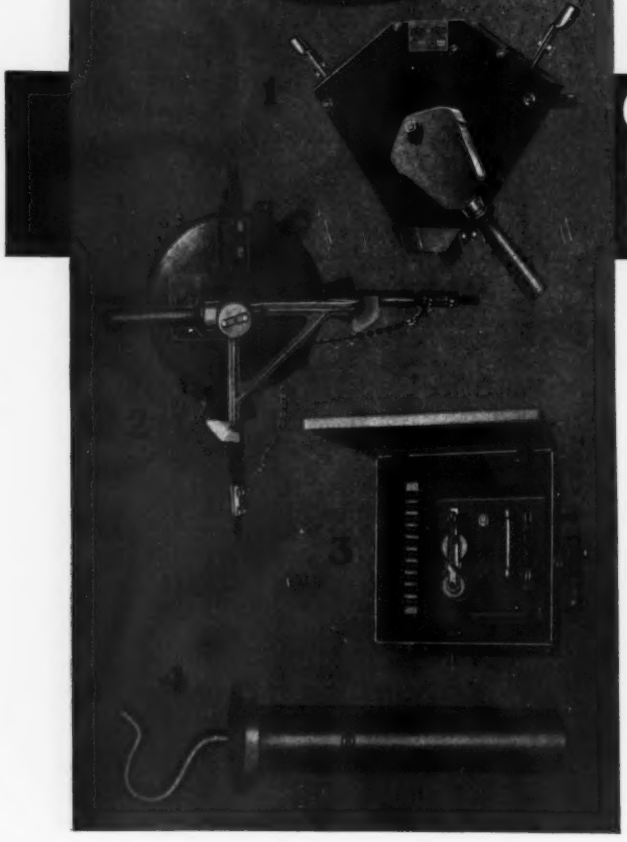
It is very gratifying and assuring to listen to these words of Mr. Richberg. "I do not believe that the foundations of our new economic structure should be laid in a different form of government. Nor do I believe that safe and secure foundations for the business of America should be laid in a political control of private enterprise." Again Mr. Richberg says, "No permanent political or economic system can be built in a modern nation that is not founded on the voluntary and intelligent cooperation of a free people."

It may be said that there has never been any different statement of policy voiced by any of the members of the Administration, but it may be said, with equal certainty, that business men of the nation believe that certain acts of the Administration looked in a different direction. And it is therefore most gratifying to the public that clear statements upon these questions are now being put forth. It is almost astounding how quickly business uplift responded to the announced determination of the Administration to alter some of its experiments and to adopt methods more in accord with tried and successful policies.

These saner policies, these practices which in the past have commanded confidence and tended to prosperity are welcome and accepted, and the result is an immediate move forward.

The United States has all of the wealth it ever had. The value of its property measured in dollars may be less than it was a few years ago, but we have all the wealth, all the mouths to feed, all the backs to be clothed, all the machinery of production, that we ever had and with a return of confidence, inspired by the announced determination of government to change policies which have been found wanting, there is every reason to expect an early return of business prosperity.

WHY GAMBLE



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The
MINING CONGRESS JOURNAL

VOLUME 20
NUMBER 12

DECEMBER
1934

A Journal for the entire mining industry published by The American Mining Congress

A New Face on the New Deal

MANY things have been happening in Washington recently, but none more interesting than the pronounced change in the Administration's attitude since elections confirming the people's approval. There was much discussion about the "right" or "left" tendencies of the President, and predictions have been plentiful concerning which way the swing would be. Obviously it is neither a right nor left swing, as those terms are generally understood; but it is apparent that the New Deal has made a deal with business.

For many months it has been certain that business could not go ahead without a better understanding with the Administration. The President has consulted with the leaders in business, and it is to be assumed that they told him what was necessary for recovery insofar as their industries were concerned. It is heartening that he has accepted their advice, even if only as a trial experiment. At any rate it is understood that business has the approval of the President to go ahead and see what it can do; if successful it will be allowed to proceed; if it fails more and greater experiments will be tried.

It is up to business and finance to make a record by promoting business and employment and getting us out of the depression.

A Dangerous Potentiality

THE persistent pressure for the abandonment of the old craft union set up in the American Federation of Labor, is making some degree of headway. In the trade union movement the most militant and powerful groups are those which are organized by industries and within which the skilled craftsmen are recognized by wage rates alone. Thus a machinist may work under a railroad, building construction, mine, textile or other industrial union without reference to any national machinists union. Where industries are now working with the employes organized in industrial unions and with the labor relation arrangements established on that basis, the plants are not subject to tie-up because of squabbles between carpenters, masons, steel workers, pipe-fitters and plumbers. In building construction at the present time these inter-union strikes are of frequent occurrence because of the national organization of each trade. Under an industrial union for all building construction, there could be a strong disciplining and penalizing influence against strikes and the petty trades union quarrels could be eliminated.

Now, however, comes the danger of having the labor of an entire industry and perhaps all pivotal industries organized. Here is the potentiality of a national labor tie-up and national labor rule by ballot. The saving thought in contemplating such a situation lies in what we have recently learned about the definite unpopularity of the general strike. Public feeling is aroused and the general strike fails because it is wrong and the participants realize it to be wrong. It is an assault upon the security of the people and a defiance to their Government. The British Isles had a national strike cycle and we can draw a lesson from their experience.

If we are to have industrial unions, such unions will be held responsible to the people's government for their acts. Heedless infringements upon the rights of all will meet with stern disapproval and drastic remedy.

Unwarranted Penny-Pinching

EVERY day our eyes and and ears are assailed by the written and verbal statements for and against the gigantic scale of our national expenditures. Every day industry sends up a sincere protest against mounting taxation. Practically all so-called big business is definitely against expansion of government bureaus, and the recent tendency along bureaucratic lines.

The mining industry has been a leader in this protest against bureaucracy. We have advanced their views wherever possible, and believe with them that the fewer bureaus the better. Nevertheless, without being inconsistent we have steadily advocated an increase in the appropriations of our Bureau of Mines. And this is why: The mining industry pays to the Federal Government more than two hundred millions annually in taxes. The purpose of all taxation is to pay for Government. The Bureau of Mines is the only agency mining men have in the Government structure, and it has performed yeoman service in many of those things which industry cannot effectively do for itself. Most of us will agree that its assistance along Safety,Research and Statistics has been invaluable.

In spite of the enormous tax paid by the mining industries, its Bureau has been curtailed approximately 40 percent. From its high point of a little more than two millions in appropriations the Bureau has been cut to a little more than a million. But did this cutting lessen the growth of bureaus? Did the discharge of valuable men in the Bureau cut the cost of Government a penny? Most certainly not. The moneys formerly available to the Bureau were merely transferred to other bureaus for still greater expansion.

The argument for or against bureaus is beside the point. The real issue is, shall the mining industry, without protest, continue to pay enormous taxes to be allocated to such laudable purposes as a study of the "Love Life of Bull Frogs," while its own Bureau languishes? Out of two hundred millions it does seem that the Government could generously set aside at least two millions for the Bureau of Mines. This would insure satisfactory and efficient work from the Bureau. This penny-pinching attitude toward a goose that lays such golden eggs should cease.

INDUSTRY'S RESPONSIBILITY

By PAUL SHOUP*

WE ARE faced with conditions that give place and substance in our business recovery programs to the most fascinating fairy tales. It is our youth that is largely unemployed. The period from the War up to 1930—some 12 years—was one of comfort and comparative luxury. Our young people who passed the twenty-one milestone since 1930 had for the most part prior thereto lived under comfortable conditions. But when they came into their own independence they found little or nothing to do. There was a constant diminution in employment. Both as a matter of loyalty, and with respect to trade unions as a matter of contract, the older employes had preference in retaining employment. Further, they were usually the family men who had immediate dependents.

We have, therefore, to deal with, in our employment program, some millions of young people ranging from 18 years of age up to say 28, who have not had work or who, having had work, have lost their jobs. They are intelligent. They have lived through a decade which furnished them something more than mere subsistence. They have energy and are not satisfied to fold their hands and wait. They have not had the experience of their elders, some of whom at least have seen times as bitter and unpromising as the present.

So, many are inclined to question the things as they are and ask for proof as to why they should be. They are joined in this by all the perennially dissatisfied, the ne'er-do-wells, the thriftless, the incompetent, the victims of ill health, of intemperance, of laziness, of misfortune, and ill judgment. The army thus becomes a formidable one. Knowing as we do in America that the sources of a comfortable life for all our inhabitants exist provided we can make them fully effective, they question whether or no there has been a proper acceptance of responsibility by industry in providing ways and means.

We must make accounting to those who are willing and able to work and especially to the younger generation. We must indeed admit that the administration of industry, as of all human affairs, is not one of divine wisdom, but full of error with many debits for the things ill done as against the credits for the things well done. Yet in such confession with a humble and contrite heart we must lay claim to confidence on the ground that with all its mistakes there has been and is now wisdom in industry, loyalty to the cause of creation, and an increasing knowledge, both as to what should be done and the way to do it; and that over a period of years there has always been an increased living standard. Most emphatically we need to impress the idea, born of experience of all civilization, that a perfect plan is nothing more than a vision and that the imperfect reality comes through knowledge, experience, the willingness to do, and then, if a mistake be made, to undo it; with patience for detail and a skill in performance—which after real labor of mind and hand gives a result worth while. We need to impress wherever we can the thought that visionary and sketchy promises produce nothing but trouble. Only a few people are so gifted as to do many things well. If a man by long experience and hard labor acquires a knowledge and understanding of one vocation and that makes him useful as a member of society, he had done well. We cannot transplant artisans from the shops to the field, nor farmers from the land to the factory and expect productive results. Here in California we undertook after the War, at an expense of some millions of dollars, to place former solders upon state purchased farms at Delhi and Durham; these limited experiments under competent instruction and with no lack of money, were both failures.

Yet in these days of distress and poverty and lack of work, this recurring dream of "Brook farms" becomes again a vision of those who have looked upon nature as a beneficent goddess bestowing her bounty freely upon any who might occupy the land. They have not known or have failed to realize that, with every tick of the clock, she tries the energy, the courage, the knowledge, the patience and the persistence of those who would take crops from the soil, lumber from the forests, or minerals from the mine. She tries the efforts of the farmer with an army of opposition from the smallest bacillus to the most destructive of storms or the hottest of burning suns.

So when our youth and when others not so young perceive these abundant resources that might well afford a comfortable living for all of our people, they may fail to realize that none of these things they desire are created easily and that both natural forces and human error stand in the way of easy creation, easy interchange, easy distribution. There are no knots in the boards from the sawmill for him who is not engaged in that industry. There is no overburden of waste material, no pinching out of a paying vein, for him who is not engaged in mining. The fish always bite for the man who never goes fishing.

It is therefore difficult to convince those who are not engaged in industry that industry should not find an easy and quick way to give employment to all. It is particularly true that many of our statesmen do not understand these problems of industry and some of them who understand the problems of one industry give no heed to the problems of the others. And, on the other hand, it is easy for our people collectively, and that includes industry, to throw upon governments created for an entirely different purpose, the problems of our business life when they become greatly burdensome. Surely this is not because of any belief that our fellow citizens who go to our state capitals or go to Washington are better equipped by experience or training to meet these problems than are those engaged in the industry. Surely it is not because we can expect of government, which was created for the purpose of protecting life and property and to give the individual the fullest freedom compatible with the welfare of the country, out of its inexperience and lack of adaptability to business uses, to solve the problem that the wisest judgment in industry born of knowledge and experience cannot solve. No, it is not because of these reasons but for the simple reason that government has an apparently unlimited bank account through the power of taxation. It can draw upon that bank account in hours of distress to provide jobs through what may be wasteful activities, untried practices, and bold experiments. And in that way of postponing the evil day, a great danger lies.

But industry has not escaped its responsibilities. They still are there. It can only cooperate by asking that government give it a chance; and be not

* Vice Chairman, Southern Pacific Company.
† Presented Sept. 27 to the Western Division Meeting of The American Mining Congress, San Francisco, Calif.

in as big a hurry to have corrected conditions for which government itself is largely responsible—for it, too, is human and full of error.

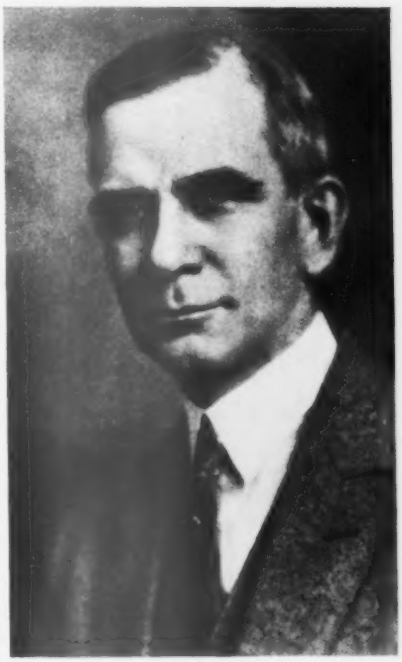
Since March, 1933, there have been 49 new agencies created by the national government to carry on or, deal with industry. Perhaps three or four of them are adaptations of agencies already existing. The others are new. Some are in addition to agencies previously provided by the government in carrying on competition with private industry. In one place or another, as a result of these agencies, there is no department of industry in which the government either is not engaged or cannot engage—this either by the immediate undertaking of industry's work or the control of industry through laws of limitation and amplification; or of lending money and the power that goes with the lending; or the furnishing of both form and substance whereby a group of people can engage under government direction in any business activity that they may choose. The Tennessee Valley Authority and its associated Electric, Home and Farm Authority, and the Tennessee Valley Associated Cooperatives, for example, build dams, generate and sell power, develop fertilizers, arrange for vocational adjustment of unemployed men and women, finance consumers of electricity in the purchase of electric equipment, organize cooperative societies, including their financing with the objectives of raising, producing, manufacturing, buying and selling all farm products, livestock, goods, wares and merchandise of every class and description—perfect "Brook farm" associated with the government.

Remember though that these agencies were created in response to an insistant demand from a great number of people.

Now, the greatest danger in all these well meant activities lies in the fact that there is no accounting in the sense of assuming financial responsibility for the results to the American people. *Private industry bears all the burden of taxation.* The government expenditures, whether outright or in loans, whether federal, state or local, must in the end be met by taxation where not repaid. We can borrow to a certain extent against the future. The day comes when this is no longer possible. Our political budgets are not balanced in the meantime. Eventually, we then reach national bankruptcy or inflation derived from necessity instead of intention—and usually both. The power to tax is unlimited; the power to collect has finally a definite limitation.

What Wealth Have We to Bear the Tax Burden?

Let us then examine the facts that we may know what course must be pursued to avoid repudiation of public debts or a period of worthless money, or both. Putting it another way, how far can the government go in spending money and relying upon the tax payer of the present and the future to pay the bill? We have no way of measuring wealth except by the dollar value which likewise measures our tax obligations. In the United States we find that our national wealth as measured by dollars reached its maximum in 1920—489 billions of dollars. Thereafter, year by year, the amount dropped. Post war adjustments were under way. In the supposed boom year of 1929 it had fallen to 362 billions. In 1932 it was 247 billions and in 1933 was even lower, though a complete estimate is not yet available. These figures of the National Industrial Conference Board are not based upon values of stock or bonds or other evidences of wealth, but the sum total of physical assets of the country. It is probable that from 1920 to 1930 there was a gradual increase in volume of these assets with no appreciable change in volume during 1931, but since that time there has probably been some impairment, in that depreciation, depletion,



Paul Shoup

and obsolescence have more than offset the creation of additional wealth. During the period 1920-1928 we were reducing our national debt, but as President Coolidge pointed out to me three months before his term expired, the state and municipal debts were increasing at a rate that offset the reduction in the national debt; and he then felt that such tendency was a direct threat to the national welfare, taking the other elements of our business situation into consideration.

What Income Have We to Meet Our Tax Bills?

Our national income, that is, the total payments for goods and services, dropped from the peak of 83 billions in 1929 to 39.4 billions of dollars in 1933, or less than in 1915; less per capita for any year back as far as 1911. But significant in this situation is the fact that the decrease from 1929 to 1933 fell with greater severity upon the return on capital and capital itself than upon the employes. Two-thirds of the loss in income was sustained by business which not only lost all of its income in many instances, but had to draw upon its capital to keep going. Of the total income of the nation in 1933, eighty percent went to persons working for wages or salaries. The people who owned industries, including all who were in business for themselves on a large or small scale, received less than 20 percent of the national income in direct return and in interest and dividends. Indeed, the people who were in business for themselves received as a return for their labor and management less per person than was paid employes on the average. The wild statements that a comparatively few people absorb a large part of the income of the United States have no foundation in fact. In 1933 the individuals with incomes of $10,000 or over received less than four percent of the total income of the country, and this in large degree was immediately redistributed through taxes and interest payments.

So we now find a country with a total national income of around forty billions of dollars and a total estimated wealth of something less than 250 billions facing annual government expenditures of more than 14 billion dollars per annum. Such is the dollar measure. Of course, all of this is not being met currently in taxes. The national interest bearing debt has increased over four billions in the last year. But let us make due allowance for any return for monies loaned, and other deductions, and get our figure down say to 12 billion dollars per annum. *Taxes of all kinds, national, state and local, now constitute the interest return on the* REAL *first mortgage on property in the United States.* The tax lien will take the property away from the owner of the supposed first mortgage. If then, we capitalize this 12 billions on the basis of a five percent return, we have what we will call a tax mortgage upon the United States for the entire value of the national property; *this must earn five percent to pay taxes.* It is no wonder that the owners of the other mortgages—first, second and third—have doubts about the security of their claims.

Our Power to Pay Taxes

The most serious aspect of the situation, however, is in the power of the people to pay. Private interest bearing debts took something like seven billions of dollars out of the national income in 1929, and, though somewhat reduced by adjustments following inability to pay, it is likely still around that figure, say for the sake of conservatism, six billions of dollars. So we have a second burden on income equal to one-half of our taxes. But on the basis of actual tax collections we find that whereas ten percent of the national income was taken in 1925 for taxes, 21 percent was taken in 1932 and

something in excess of that figure for 1933.

If we met our government expenses as we go, about one-third of our national income would have been spent in the last year for the support of governments which, of course, includes the support they have in turn extended to the needy. But last year the amount paid out by the government in wages, salaries and pensions was about one-sixth of the total *payrolls* in the country. The government payroll including pensioners was larger than that of any branch of industry excepting manufacturing and trade, the ratio, public to private pay roll having almost doubled since 1932. The diminution in income tax returns to the federal government and other state governments that have income taxes, and the inability of states and municipalities to collect taxes, sufficient to meet our current expenditures forcing the borrowing of billions, shows how extremely serious the situation is.

What Is Then Industry's Responsibility?

In the face of this situation, your President asks me what the responsibility of industry is. I would make reply —action, forceful action, united action. Let us for a few minutes only examine the facts suggesting a course that action should take.

First, let us lay down this principle: Profit in industry is essential to the creation and preservation of capital and of employment, then and only then can this burden of taxes be paid. There is no system and has been no system since the days of barbarism with hand to mouth existence, except the capitalistic system. Capital is accumulated wealth at work. The question is simply one as to who is to control capital and how. If I may reiterate what I have said heretofore, it makes no difference whether it be a lead mine in Idaho, a copper mine in Nevada, a lumber plant in Oregon, a steel plant on San Francisco Bay, a peanut stand on Market Street, a melon ranch in the Imperial Valley, or a sardine factory at Monterey; unless the black inkline in the ledger of profit can be maintained, the industry will disappear, the capital engaged in the industry will vanish, and employment will likewise totally cease. It is merely a question of time.

If a man out of his savings from wages puts money in the savings banks, it needs must be profitably invested; otherwise, he will get no return. If he gets no return, the money in reality has no value. Somebody must profitably employ that savings or it too disappears.

Therefore, I lay down the principle that the vital obligation of industry, in the interest of all the people of the United States, is to make money. Then will follow the creation of wealth, its conversion into capital, and its use in greater variety and volume of business activities than has existed heretofore. Its conservation and its profitable use depends upon its being saved from too great an erosion through taxation, too great a destruction through meddlesome even though well meant innovations, and too forced changes in ownership that will destroy the orderly processes of its use. Without this laying up of profits which constitute the wealth and then the capital of the country, we will find ourselves in the situation that a friend of mine in Chicago described as illustrating some sections of the West this year. Capital he likened to the great blankets of snow that cover the high mountains; cold, inaccessible to the reach or command of the dweller on the plains below, but in the course of time, under the melting influence of the sun, trickling down through ravines and canyons to the land he occupied, and giving him the means whereby he lived. And when the snow was missing, the plains dwellers felt it first.

With profit in industry comes increasing employment; expansion not only in volume but in variety that has made for the wealth of the world under our western civilization. If there were but a dozen articles of commerce, no matter what our knowledge or wisdom otherwise might be, shortly there would be a limitation upon our consumption when volume in each article reached the full demand of our people. But the pressure of our increase in wealth has given power to the genius of our people not only to expand in volume but in variety. Each succeeding decade has shown a tremendous spread in variety, not only in things absolutely new, but in the greater number of attractive forms given to the commodity with which we were first familiar. When I was a boy there were within my knowledge but two forms of breakfast food; there must be forty now. You may choose from your market for your breakfast table from twenty times as many items as you could have done forty years ago. These are changes in form and distribution—but other changes come through entirely new products. The automobile in my boyhood was unknown, the telephone an object of curiosity, the airplane a dream, the radio unbelievable. The physical frontiers of the world have nearly reached their limit; the frontiers of achievement in other directions are but at the beginning.

Our Wilderness of Ignorance

We are certainly in a wilderness of ignorance with respect to some of the things that touch vitally upon our lives. We know a good deal about what not to do. We talk loosely of supply and demand; of demand as if it were a fixed thing. It is not. There is no measure of human desires. Who knows what goes on in any person's mind walking down the street with ten dollars in his pocket to spend? What will he, or she spend it for? It is quite impossible to

(*Concluded on page* 17)

Convention Session, Western Division Meeting, San Francisco, Calif.

Stabilization of Mineral Industries†

*By ROBERT E. TALLY**

THE American Mining Congress, since the early post-war period, has been a strong advocate for the stabilization of the mineral industries.

These industries, due to the abnormal war demand and the consequent inflation of prices, became largely over developed. The reduced demand following the war resulted in over-production, with excessive inventories and subnormal prices.

The stabilization of these industries required an adjustment of supply to demand and the reduction of inventories to normal. Such plans, however, were in direct conflict with the anti-trust laws and to some extent in indirect conflict with the laws of human nature.

The Government was urged to cooperate with these industries, not only toward making it permissible to collectively curtail production during periods of subnormal prices, thereby regulating production to demand, but also to encourage such procedure. It was found that such governmental cooperation, requiring either a revision or a more liberal interpretation of the anti-trust laws, was not possible without the acceptance by the industries of governmental regulation.

Meetings of representatives of the different industries were held for the purpose of discussing possible ways and means for improving the condition of the mineral industry. Governmental cooperation was considered as the first and most important essential. The second essential of vital importance was the wholehearted and genuine cooperation of all members of a participating industry.

However, at that time governmental regulation was not acceptable in any form, and while the theory of collective curtailment or of regulating production to demand was considered sound, it was not discussed in sufficient detail to determine its acceptability.

While the post-war efforts of the Mining Congress toward stabilization were not successful, it is a fact that the methods suggested by the Congress are fundamentally those under which several of the mineral industry codes are now operating. These codes, however, are more elaborate and complicated than the plan suggested by the Mining Congress, and it is believed that they could be simplified to the advantage of all concerned.

Stabilization should adhere as closely as is possible, and be limited to, the law of supply and demand, and any material deviation from this law will prove to be complex, artificial, and ineffective. Unfortunately the so-called law of the survival of the fittest does not function when applied to overdeveloped natural resource industries.

While the economic crisis under which we have been suffering for the past five years, and which continues to rock the business, financial and social structure of the nation, was due to a combination of unfavorable factors, it is conceded that the most serious permanent problem of the mineral industry is that of over-production; the only practical solution of which is the permanent regulation of production to demand.

It is therefore probable that this industry will require governmental cooperation, with a minimum of regulation, for some years. It is even possible that in some cases a certain amount of coercion will be needed, as experiences of the past few years show conclusively that there are usually some producers in each industry that will not cooperate for the benefit of their industry as a whole. Such members either favor a policy of the survival of the fittest or feel that by refusing to cooperate they will participate in the benefits without sharing in the responsibilities. Such a selfish attitude increases the difficulties and jeopardizes the success of any cooperative plan.

This selfishness is responsible to a considerable extent for the lack of business leadership; it has contributed largely to the inability of business to manage its own affairs, thereby inviting if not forcing governmental regulation.

The biological theory of the survival of the fittest is also frequently referred to as the natural law of economics, and when applied to the mineral industries is equivalent to the practice of producing in excess of market demand until declining prices force the higher cost producers to cease operations.

Past experience has shown that the shut-down expense of a mine is so large that it is usually more economical to continue to operate even at a loss. Such properties do not close except as a last resort, and rarely until the lower cost operations become unprofitable. Further, the closed mines resume production when prices increase sufficiently to permit the more favorable units to yield satisfactory returns.

The stabilization of the mineral industry would be relatively simple if the theory of the survival of the fittest was effective, but it is not. This theory, however, might function satisfactorily in some of the other industries. Likewise stabilization, if confined to the prompt regulation of production to demand, will be simple and effective if the human element can be controlled. Excessive inventories, however, are equivalent to over-production, and until reduced to normal complicate any cooperative plan.

The history of the mineral industry has shown that prices automatically increase or decrease in accordance with inventory fluctuations above or below a normal basis. Therefore reasonable prices can be maintained by adjusting supply to demand if inventories have been sufficiently reduced. Most of the complications in the mineral industry codes are due to excessive inventories or over-production, or both, and it is these conditions that suggest price fixing in one form or another.

The great industrial development of these United States was accomplished under a hands-off policy on the part of the Government, and it was under these conditions that the greatest industrial, financial and political leaders in the history of the nation were developed. Leadership of that old successful type is not created under present coercive or regulatory measures, and it is probable that a new type of leadership is essential for the future: the type that can inspire confidence and cooperation. It may require a generation or more to develop this type of executive, as such cooperation is contrary to the old order of doing business and to the natural selfishness of the average individual.

The old leaders were virtually dictators who did not hestitate to ruin their competitors by one means or another, and it was this abuse of power that was

* President, United Verde Copper Co.

† Presented Sept. 27 to the Western Division Meeting, American Mining Congress, San Francisco, Calif.

responsible for the anti-trust legislation; but, as is usual, in this case American legislation has gone from one extreme to another.

Until recent years, and with the exception of a few periods of depression, ready markets existed for the nation's production. These markets were both foreign and domestic, and there was no overdevelopment of industry. Conditions have changed, however, and the methods of doing business must change to meet these new conditions. Until this is done no degree of prosperity can be expected.

Cooperation among competitors for the benefit of their specific industry is a vital need not based in any respect on altruism or softness. Bitter experience has shown that excess production, forced upon a market with insufficient demand, demoralizes the price structure. This practice under the mineral industry comes under the classification of cutthroat competition, and the aim of cooperation is that all concerned may participate in the benefits resulting from the improved conditions brought about through such united effort.

There are in every industry a few unduly selfish members who are unwilling to cooperate unless given a favored position, and such members would rather wreck an industry than to yield to what is generally considered reasonable. Such selfishness is primarily the cause of large inventories, with resultant demoralization and governmental regulation. Why should the majority members of an industry, as well as all employes in that industry and also the public, suffer because of unreasonable resistance by a minority group? And who but the Government can correct this situation?

Those most selfishly inclined should realize that it is not possible to trade or maneuver unto themselves any undue advantages as compared to the other members. Even though this were possible, the benefits would be temporary and would result in the loss of confidence.

The benefits of cooperation have been emphasized with the hope of showing the advantages thereof. Likewise, the result of the alternative theory of "the battle to the strong" has been stressed, together with the difficulties of effective cooperation and the justification for minimum governmental regulation. This latter is unfortunate, but it is by far the lesser of two evils, and as such should be accepted until a better solution presents itself.

The attitude of the Government, however, as shown in the interpretation of the National Industrial Recovery Act, is subject to some serious and just criticism. There is no doubt that this attitude is retarding recovery, and that it has contributed to the lack of confidence prevailing among the country's business and financial interests.

It is probable that 90 percent or more of the American people are not interested in the ways and means for promoting recovery, but they are vitally concerned in the results. Labor wants employment at fair wages and with reasonable standards of living. The farmer wants a market for his crops, with at least some margin of profit, and the business man likewise expects a fair return on his investment.

The people as a whole look to President Roosevelt and to his administration, as well as to the leaders in finance and industry, to develop a simple, equitable, and effective recovery plan. During the present crisis there has been no really constructive or sound leadership on the part of business and finance. Political leadership in itself cannot succeed, and recovery demands the most wholehearted and unselfish cooperation of the most broadminded leaders in business, finance, and government.

Surely there are a few such leaders among these groups, with sufficient breadth of vision and patriotism to efface their own particular interests and who will be content to work for the common good. It is obvious that they will participate in such benefits as will accrue.

Robert E. Tally

The only leadership shown thus far has been by the Administration, which started off admirably and at a time when action was sorely needed. This leadership prevented a probable complete collapse; but it has since become too technical and too extreme, and it now seems doomed to failure unless it can inspire the trust of those able to increase the purchasing power of the nation along sound and practical lines. This cooperation can be secured, but confidence must be its foundation.

The Government has flirted with and has been decidedly partial to organized labor in the interpretation of collective bargaining. Business has in the past and will in the future resist these inequities. The confidence and cooperation of business under such conditions is not possible, and a more just attitude on the part of the Government in this respect is essential.

Labor should have the right to bargain collectively through representatives of its own choosing, and without interference in any way from its employers; it is entitled to good wages and favorable working conditions, with freedom either to join or not to join unions, as it may see fit. But by the same token there should be no interference or coercion by union organizers or officials, whether on or off duty.

A review of the operations of the Administration's recovery program shows that the Government has relaxed in the enforcement of the anti-trust laws to the extent of permitting industry to regulate production to demand, and in some cases to the fixation of prices; while, as heretofore stated, business has increased wages, spread employment, and agreed to collective bargaining. The Government has also, through vast public expenditures, substantially reduced unemployment and increased the purchasing power of the nation. The result has been a larger volume of business at better prices, with conditions in general showing a material improvement.

Even though a subject of controversy, the NRA has nevertheless been helpful as an emergency measure, and there is one important part of it that should be made permanent: making it permissible and when necessary compulsory to regulate production to demand in the overdeveloped natural resource industries, thereby preventing the wasting of the nation's natural resources.

In fact, just as soon as inventory adjustments will permit, codes of fair competition should be limited to this provision, with reasonable safeguards for the interests of labor and the public. The prevailing dissatisfaction in the operation of codes is due, first, to the fact that most of the codes are unnecessarily complicated, thereby requiring simplification, and secondly that many industries do not need codes or an understanding of any kind except with regard to labor.

There is a general and growing antagonism to the NRA, which if not relieved will jeopardize the future of the entire recovery program. This antagonism in part at least is justified, and is due to the excessive public expenditures and to the unfair attitude of the Government with regard to taxes, profits, and labor.

However, the results of the Administration's recovery program to date unquestionably warrant its continuance and the cooperation of the entire mineral industry, and as a representative of this industry the American Mining Congress should be ready and willing not only to assist in every way possible but also to submit constructive criticism and suggestions for a more equitable and effective governmental policy.

The following summary outlines the suggestions which, in my opinion, the Congress should make:

1. Simplification of codes of fair competition, by limiting the terms thereof to conform (a) with the law of supply and demand, and (b) with equitable provisions for labor and the public. Price fixing should be prohibited except in industries having excess inventories, and in such cases provisions should be made

(*Continued on page* 17)

The Utilization and Distribution of Power From the Boulder Dam†

By E. H. SNYDER*

THE gross value of the total past production of gold, silver, copper, lead and zinc from Nevada is estimated at more than fourteen hundred million dollars, yet Nevada's largest cities are: Reno, with a population of 18,000 (partially supported by six weeks' tourists); Las Vegas, with 5,000; and Elko and Ely, with 3,000 each. In addition to the four cities named, only five cities in the state have a population in excess of 1,000. Nevada was recently described by one of my friends, who was considering the possibilities of power distribution, as "a 100-mile state." When asked for an explanation, he replied, "The average distance between places is more than 100 miles.

The matter of long distances between "places" within the state; the arid climate; the location of the railroads, that make the cities in California and Utah natural supply points; the absence of both oil and coal deposits in the state; and the financing of its mines by outside capital, are the principal reasons why Nevada has retained so little of the vast wealth it has produced in the past.

Some Nevadans, who, for 20 years, have been directly exposed to the powerful "emanations" from California, and who have partially acquired the technique of the builders of the great state to the West, are now confident that Nevada can win its famous battle to have a population equivalent to at least one square man to the square mile, and, at the same time, maintain the highest per capita wealth of any state in the Union. The reasons for this confidence are:

1. The completion of several hundred miles of concrete and oiled highways, which have reduced the time between places by more than half, and the cost of transportation of ore and farm products from isolated communities to the railroads to one-third the former costs.

2. The program for restoring silver to its rightful place as basic money, and the revaluation of gold.

3. The development of large tonnages of complex lead-zinc sulphide ores, iron-manganese ores, and suitable metallurgy for their treatment.

4. The improvement in the metallurgy of gold ores.

5. The growth of the Pacific Coast market for raw materials.

6. The construction of the Hoover Dam; the cheap power from which will soon be available, to make practical the establishment of an electro-chemical industry in the state.

Nevadans, who have seen large communities reduced to ghost cities within a few years, and the state's prosperity come and go with the ups and downs of metal prices, will now tell you that the gains listed above are permanent. (Some of you may recognize the use of California technique in the above statement.) The improvements in economic conditions, that are listed above, explain why the Nevadans can now see past the depression, in spite of the fact that present low prices for lead and zinc may soon reduce the activities, of the mines producing these metals, to the maintenance basis of 1932.

The optimism of those in the lead-zinc industry has been acquired principally by an analysis of the possibilities of converting their ores to finished products by the utilization of Hoover Dam power.

Volumes have been written about the Hoover Dam. I do not propose to infringe on the rights of the gentlemen of the press, by attempting to describe this structure. I recommend that you go see for yourselves. When completed, it will represent an investment of one hundred sixty-five millions of dollars.

The U. S. reclamation engineers estimate that a total of 660,000 firm horsepower can be generated at the Hoover Dam after its completion, and, in addition, 340,000 horsepower of excess or secondary power during the months of heavy runoff of water from the Colorado River Basin.

The estimated cost of the firm power at the switchboard is given at 2.15 mills per kw.h., equivalent to $14.05 per hp.-year, and the cost of the excess or secondary power, at 0.8 mills per kw.h., equivalent to $5.22 per hp.-year.

The importance of this power for electro-chemical industries can be better appreciated, when the $14 cost per hp.-year at the Hoover Dam is compared with the $30 per year cost per horsepower at Niagara.

One hundred twenty thousand, or 18 percent, of the total firm horsepower to be generated at Hoover Dam has been reserved for use in the state of Nevada.

My purpose is to give you briefly some facts relating to the possible use of a portion of this power for recovering and refining lead-zinc ores near Boulder City. I refer those of you who are interested in raw materials in Nevada for use in other electro-chemical industries, to a paper written by Messrs. J. A. Carpenter, professor of mining, Mackay School of Mines, and Alfred Merrit Smith, mining engineer of the Nevada State Bureau of Mines. (*Mining and Metallurgy*, August, 1932.)

Ten years of intensive work in the Pioche and the Comet districts (situated in Lincoln County, Nev., approximately 150 miles north of Boulder City) has resulted in the development of a sufficient tonnage of lead-zinc sulphide ores to assure a long life for proposed plants to be constructed for their treatment.

At present, approximately 8,000 tons per month of crude lead-zinc ore from one of the Pioche mines is being shipped to Bauer, Utah, for milling. The lead concentrate is smelted in Utah, and the zinc concentrate shipped to the electrolytic zinc plant at Great Falls, Mont.

This ore assays .034 ounce gold, 7.0 ounces silver, 6.7 percent lead, and 18.4 percent zinc. Its calculated gross value, using 4 cents per pound for the price of zinc and 4 cents for the price of lead, and the present Government prices for gold and silver, is $25.78 per ton. The value of this ore, f.o.b. the mine, with present methods of handling, is $3.90 per ton. In other words, the gross earnings of the Nevada mine, out of which all mining costs must be paid, are equivalent to only 15 percent of the gross value of the ore.

The remaining 85 percent of the gross value is accounted for, as follows:

Metallurgical losses	15.0%
Overall transportation, including freight on metals to market...	23.5%
Cost and profits of metallurgical plants situated in other states.	46.5%

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† Presented Sept. 25 to Western Division Meeting, American Mining Congress, San Francisco, Calif.

The outstanding economic factor that dictates the long, devious route the zinc produced in Nevada must take at present, is that of cheap power at the Montana electrolytic zinc plants.

The total power required to produce a ton of zinc is approximately 3,500 kw.h. Power for electrolytic purposes in Montana costs 3.82 mills per kw.h. ($25 per hp.-year), and in Utah approximately 6 mills per kw.h. ($39 per hp.-year). The difference in the cost of power between Montana and Utah is equivalent to $7.63 per ton of zinc. The freight on a ton of zinc concentrate (containing 58 percent zinc) from Utah mills to Great Falls, Mont., is $4.12 per ton, equivalent to $7.46 per ton of metal (allowing 5 percent for metallurgical losses).

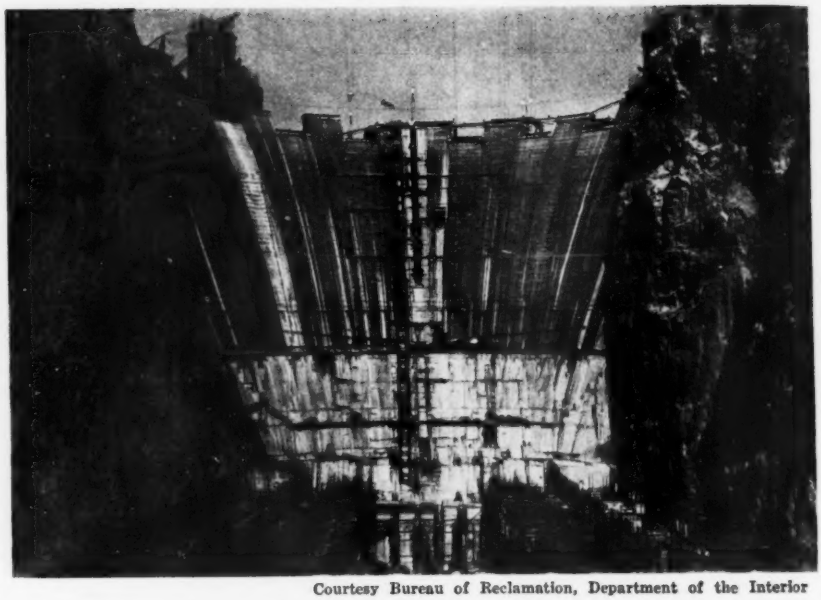
When the costs of amortization, interest, and organization are considered, it is apparent why zinc concentrates produced at Utah mills are shipped to Montana.

The question arises, as to whether Nevada, which has contributed so liberally in the past to the building of industries in other states, can now have not only a higher portion of the wealth it produces, but, in addition, receive contributions from neighboring states.

The last four years of depression have taught me to make forecasts only when forced to do so. I offer no prophecies as to how or when, if ever, a zinc plant will be built near Boulder City.

An estimate, based on power at 2.5 mills per kw.h. at Boulder City and 3.82 mills per kw.h. at Great Falls, shows that the overall power and transportation costs (including freight to market) on the zinc from Utah concentrate totals $29.33 per ton of metal, when this concentrate is treated at Great Falls, as compared with $24.96 per ton of metal for power and transportation if the concentrate were treated at Boulder City, making a difference of $4.37 per ton of metal ($2.41 per ton of concentrate) in favor of Boulder City.

A similar comparison, based on the assumption that the point of origin of the concentrate is at a mill at Pioche, shows the overall costs of power and transportation per ton of zinc total $32.67, when Pioche concentrate is treated at Great Falls, as compared with a total of $22.50 per ton of zinc, if Pioche concentrate were treated at Boulder City.



Courtesy Bureau of Reclamation, Department of the Interior

Downstream face of Boulder Dam and a Portion of the Power Plant as Seen From the Low-Level Catwalk

The estimated difference in favor of Boulder City is $10.17 per ton of metal, equivalent to $5.60 per ton of concentrate.

A great number of factors, other than power and transportation, must be considered, to properly determine the merits of the proposal to build an electrolytic zinc plant near Boulder City; the most important of which is the utilization of the large quantity (1.5 tons per ton of metal) of by-product sulphuric acid produced in the process. Generally speaking, keeping cool at Las Vegas should be no more difficult than keeping warm at Great Falls.

The installation costs of mills in the Comet and the Pioche districts and an electrolytic zinc plant near Boulder City with a capacity of 150 tons of metal per day are estimated at $6,250,000. This investment would furnish direct stable employment for approximately 1,000 people and support a population in excess of 5,000.

Some of you may wonder why I suggest the increasing of facilities for producing zinc at this time. Fortunately, or not, I have accumulated, during the past 25 years, beliefs summarized briefly as follows:

1. That the reason the standard of living in the United States is higher than in any other country in the world is because the production of wealth per capita in the United States is greater than in any other country in the world.

2. That we are not going to become more prosperous by destroying wealth, or by producing less.

3. That the more the average man produces, the more the average man can have, and that, therefore, we should continue to create machinery and to develop power, to increase the production per capita.

4. That the potential demand of the American people for necessities and luxuries is far greater than the effective demand had during any previous boom period.

5. That this potential demand will ultimately be converted to an effective demand, and that, in the not too distant future, we shall have an acute shortage of labor in the United States.

If my interpretation of fundamentals, as expressed above, is correct, now is an opportune time for the western mining industry to make preparation for the utilization of the power that will be available within two years at the Hoover Dam.

This land of plenty will recover from the disease it now has, when the disparity in the price level is adjusted to permit the normal, profitable production of the basic wealth that comes from the mine and the farm.

POWER AND TRANSPORTATION COSTS

	Cost per ton of Zinc — Great Falls	Boulder City
APPLIED TO UTAH CONCENTRATE		
Freight on concentrate from Utah, 58% concentrate @ $4.12	$7.46	$7.46
Freight on zinc to market	8.50	8.75
Power—3,500 kw.h. @ 3.82 mills, and 2.5 mills	13.37	8.75
Total	$29.33	$24.96
Difference in favor of Boulder City—$4.37 per ton of metal. 2.41 per ton of concentrate.		

APPLIED TO NEVADA CONCENTRATE (Mill at Pioche, Nev.)	Cost per ton of Zinc — Great Falls	Boulder City
Freight on concentrate:		
Pioche to Great Falls @ $5.95	$10.80	.....
Pioche to Boulder City @ $2.75	.....	$5.00
Freight on zinc to market	8.50	8.75
Power—3,500 kw.h. @ 3.82 mills, and 2.5 mills	13.37	8.75
Total	$32.67	$22.50
Difference in favor of Boulder City—$10.17 per ton of metal. 5.60 per ton of concentrate.		

H. C. Marchant, secretary of The Rocky Mountain Coal Mining Institute, stated the winter meeting of the Institute will be held in February, and probably in Denver.

Industry's Responsibility

(*Continued from page* 12)

say that the world will consume this much or that much of any one article. We speak of the wealth of the country as I did a few minutes ago as its physical assets measured by dollars and cents. Yet we know full well that the real source of wealth of the country lies in its people. We speak of the value of goods and services. Without services there would be no value to goods. We speak of the uses of money and of credit. We find no proved conclusions as to just what either of these useful instrumentalities really is. A banker told me the other day that outside of the intrinsic value of money, such as gold and silver have in the arts, money had no value. He said, in measuring the assets of a nation we accordingly give no value to money except that which appertains to its other uses as metals. I talked with another learned authority who assured me that money had a very definite value, and that we cannot say when the people lose confidence in money and it becomes worthless that nothing has been lost except so much paper. Use, he said, gave it value. He pointed out also that the greater its use the less its value per unit; that is, that the increase of interchange of goods and services through the use of a stable money in which there was unquestioned confidence resulted in higher wages and higher prices.

The laws as laid down by our economists of a generation ago were that certain metals were used as money because they had certain characteristics—intrinsic value, hard to counterfeit, easy of recognition, subject to little wear or tear in use, easily minted into acceptable pieces, and so on. Some economists are disputing all of these elements now as not being necessary because of the use of paper money. Some want a commodity dollar. We have reached the point where our government considers the gold too valuable for our citizens to hoard so it hoards it itself. Must its value be maintained by free use? What causes inflation? And deflation? What are the relative influences of credit and money on prices?

Research

You have in your industry great scientists with fine laboratories that have made almost incomprehensible progress in separating metals from their baser associates with ease and economy. May I then suggest for your further consideration the establishment of a laboratory of investigation along another line. Take men of the type of Professor Laughlin who was the economist of my school boy days, and set up a laboratory of research with respect to money and credit and the part they play in the interchange of goods and services and in the establishment and maintenance of wealth. Put practical men into this research work as well as those with a book background of knowledge. I know of no industry better equipped to do this than your own. I know of none that has a greater interest in the outcome. I know of no greater contribution that could be made to the stability of employment of capital and employes than sound conclusions as to the uses and abuses of money, credit, interest exchange, and their control.

Finally, may I suggest that your organization take strong initiative in uniting the industry of this country in combating all that which is unsound in the present tendency to try every kind of remedy upon an ailing country. This does not mean that there is nothing new worth doing. This does not mean that emergencies do not have to be met with extraordinary measures. This does not even imply that in any considerable measure unsound remedies are being selfishly advanced. But the very good intent and the good will back of them make them doubly dangerous. Stick to that old admonition that we had in school: "Prove it." If it lacks a basis of sound foundation, point that out. You may not require a Q. E. D. but you can require a reasonable hypothesis. The press of this country is quite willing to follow sound reasoning and common sense philosophy. Its people are willing, too, notwithstanding their despair and their distress, but the need must be shown. It seems to me the program of your responsibility is simple. The unbearable burden of taxation must be reduced. The working capital of the country which gives us all employment must be protected. The only way to protect it is to have profit in industry. The only way to have satisfied employment is in work to which men are accustomed and can do well and at homes which they have now established. This work can be provided only if there is profit in industry.

Confidence can be maintained only through assurance of protection to wealth and a return to capital and an increasing employment of labor. There remains a further obligation which it seems to me you may well assume of intensive exploration of these questions of money, credit, interest, supply and demand in a practical way. The way of knowledge is the way to advance.

> "THE American Mining Congress is peculiarly fitted to handle matters of national importance; it presents facts and figures to our legislators, so that they can deal fairly and squarely with the mineral industry. In this field, the Congress has a position that no other mining association can take and, because of its long standing and high repute, it is worthy of the support of every mining industry and everybody engaged in mining. I hope that many will join the Congress and help it in its work, and do everything they can to strengthen its hands because of the difficult times we have before us. * * * I do not think the importance of mining can be over-estimated, particularly as regards these Western Areas. Mining was the influence that led to the settlement of the West and, given reasonable consideration, I think it can be the influence that will return prosperity to the West and contribute to the prosperity of the Nation."
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> *Excerpt from talk by W. S. Boyd, Vice President, Utah Copper Co. and Nevada Consolidated Copper Corp., to the opening session of Western Division Meeting, The American Mining Congress, San Francisco, Calif.*

Stabilization of Mineral Industries

(*Continued from page* 14)

for the reduction of these inventories to normal within a reasonable period of time.

2. Discontinuation of codes, except in the overdeveloped natural resource industries, as well as in all others where in the opinion of the industries affected they are not absolutely essential, together with emergency legislation for minimum wages and hours of employment.

3. The appointment of a committee of from three to five men, representing the highest type of American business and financial executives, to cooperate with the Administration in a more equitable and effective recovery program. The work of this committee should have no publicity, except that which may be volunteered by the Administration from time to time.

The American Mining Congress has a record of accomplishment. It represents one group of industries, yet it realizes that these industries will prosper only as the nation prospers. When it exercises its right to criticise it realizes that to be of benefit its criticism must be constructive, not destructve. It is in this spirit that these suggestions are offered.

ACCIDENT PREVENTION

in

METAL MINES†

By OSCAR A. GLAESER*

ACCIDENT prevention work in both the metal and coal mines of the United States has advanced rapidly in the past 10 years. Many enviable safety records have been established and much has been written concerning the science of this phase of human engineering.

Strange as it may seem no two companies have followed similar plans in their campaign against accidents. Standardization has been the order of the times, within limits, in practically every phase of mine operation except in safety. It may be assumed that this is a natural condition because the human equation is one of the factors in accident prevention that has never been completely understood.

Each company has worked out its own theories and principles of safety in its mines and plants based upon the management's ideas on how best to induce labor to accept the tenets of "Safety First."

Three basic facts are universally conceded by the operators of large mines. First: that safety is management's responsibility; second: that correct supervision is necessary to produce the desired results; and third: that educational processes must be emphatic and continuous. The mining companies that have accepted these three fundamentals and built their program upon them have been singularly successful.

Many successful companies have presented their program of accident prevention in this and contemporary publications. With few exceptions these have been large mining corporations. To retell their story, while no doubt worthy, would be a repetition of what has already been recorded.

During the recent past and at the present, many large mines, except gold mines, have been shut down or are being operated on a greatly curtailed production basis. In their place have come numerous gold mines. Most of them are old properties reborn in the new found hope of an increased value of the yellow metal.

The mining world is gold conscious. It is, therefore, entirely fitting that we pause to reflect upon the safety needs of the re-energized gold mining industry. With very few exceptions the gold mines of this country have a safety problem peculiar to themselves and vastly different from our large tonnage base metal mines.

The mad scramble and search for the yellow metal is on. Never in our time has gold received the attention it is now receiving. In California alone there are approximately 8,000 men gainfully employed in its gold mines, large and small. There must be between 8,000 and 10,000 more men, women and children in the hills of California along its rivers, ravines, creeks, and gulches sniping their way to an independent living. Here I beg the indulgence of the reader while I pay tribute to those sturdy twentieth century pioneers who have been referred to as "economic refugees." We find them everywhere looking for gold with the pan, rocker or sluice box. The return for their labor is small but as some have proudly expressed it, "it buys beans," and so they search on proud of their new found independence. There is another but a smaller group who individually or in small copartnerships delve underground for the precious metal. This group work for themselves and employ no help.

Many men now in search for gold have not always been miners and are not now miners. Many of them were high in professional and business life before the depression. Druggists, doctors, dentists, real estate men, office managers, clerks, business men and laborers, and I have even met a pearl-diver (not of the kitchen variety) trying to find gold in the deeper streams. Many of the professional and business men would be quick to ridicule the idea of a miner or engineer venturing into their line of business but in turn they have shown no hesitancy to plunge into gold mining. They are their own examining engineers, their own superintendent, and mine foreman although many of them have never previously been in a mine or handled a stick of dynamite.

The equipment used in both placer and underground mining by these venturesome people in their operations vary as their former occupations. Recently I saw three young men trying desperately to lower an old but brightly polished nickel-plated fire engine boiler down the steep banks of the lower Klamath River. Many mines are, of course, worked according to well-developed plans. They are equipped with modern mining machinery and headed by men with many years of mining experience.

With this picture as our background where shall we start in a discussion of applied accident prevention. It may be well to first inquire into the distribution of accidents. Do they all happen in the mines operated by inexperienced men? No, not at all, practically all mines, large and small, are quite uniformly represented in a tabulation of accidents. The accident rate, based upon hours of exposure, is, of course, less in the larger mines and decreases very rapidly in mines where accident prevention receives due thought.

Fundamentals generally hold for all conditions and so in the business of mining the fundamentals of safety apply regardless of the size of the operation or the kind of material mined.

It has often been said that to be successful safety must begin with the management at the top and percolate downward throughout the entire organization.

Should management assume the responsibility of accident prevention in its plants? Or in other words, should management be responsible for the safety of its employes? There are three answers. Efficiency is based upon precise planning. Accidents are unplanned happenings that interrupt the planned processes causing loss of time, loss of manpower and frequently also loss of materials and damage to equipment. Another answer is: leadership imposes a number of moral obligations. One of the most important of these is the well-being of the followers. Another answer is: in the interest of economy manage-

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† Presented Sept. 26 to the Western Division Meeting, American Mining Congress, San Francisco, Calif.

ment should assume this responsibility because industry pays the bill.

A mine manager cannot afford to disregard these three facts. It makes little difference whether three or three thousand men are employed if the management honestly believes that the miners should wear goggles while performing certain duties so as to prevent eye injuries from flying chips or rock, etc., then the men will be prevailed upon to wear them. The protection afforded by goggles is just as effective in the smallest mine as it is in the largest. I am frequently told that the employes have been given goggles and have been told to wear them, "but they won't use them, and, of course, I can't fire a man just because he won't wear the goggles I have given him." Does that sound like a decision coming from a clear thinking mining and business man? Suppose the matter concerned company property instead of a workman's eyes? Would the action still be as indecisive? Workmen are generally willing to follow orders, provided, of course, they understand them as such and not as apologies. Goggles are an effective preventive to eye injuries in most mines and their use is recommended particularly when collaring and blowing out drill holes, when breaking rock with a hammer, when moiling or picking hitches and cutting samples, and at any other time when the eyes are endangered by flying particles.

The mine manager or superintendent should post common sense safety rules and insist upon their observance. It has been said that the authority to give orders carries with it the responsibility of seeing these orders properly executed. Safety orders, whether printed or typed, should never be just posted or handed out. Employes should be told of their purpose. It should be pointed out that they are not so-called nuisance rules but rather warning signs along life's industrial highway telling tersely of dangers that have been only too thoroughly demonstrated by thousands of unfortunate men who did not know, or knowing did not heed.

While on the subject of safety rules, I might suggest that mine operators, and those contemplating mine operation, acquaint themselves with the established state laws and orders concerning mining. These are generally quite complete and go a long ways toward safety in mining if observed. I will cite one example, many more could be produced. Two men, neither of them miners, started to reopen an old mine. The shaft had to be pumped out so a small gasoline engine-driven pump was obtained. It was set up underground and started. One of the partners climbed down the shaft and was overcome by gas. The other one went down to see what was wrong. Both were brought out dead. The state safety orders specifically prohibit the use of gasoline engines underground. If men would only realize how trivial the circumstances that often lead to death, and how simply a little knowledge and self-discipline would alter these circumstances.

Oscar A. Glaeser

Mine supervision is at best a serious problem. When the boss leaves the working face he loses sight of the men working there. In a shop a foreman can generally see 75 percent of his people by merely looking around. Not so in a mine as we well know. Even in small mines a boss is rarely with each man more than 10 minutes of the work day. In that 10 minutes he must leave enough of himself in the mind of the man to carry that miner and his work successfully through the entire day. It has been said that a supervisor should be chosen for his super-vision. Responsible employers have adopted this policy.

In the smaller mines we are faced with a more difficult situation. Ninety percent of the gold mining ventures never get beyond the one-man supervisory stage. His position in the company varies. He may be the president or a stockholder or a partner or a consulting engineer. In any event he is the manager, superintendent, the mine and mill foreman, and the mine and mill shiftboss. He is the geologist, the purchasing agent and the bookkeeper. If the cook runs short of butter or if a special gasket or bolt is needed in the mill, he goes to town for it. If the mine is operated more than one shift, the superintendent, if at all conscientious, goes underground with the afternoon shift and sees it off to a good start, leaving it to their own good judgment to carry on throughout the shift. Should a trip to town be necessary, the superintendent may or may not go underground first thing in the morning. The mine trip at best is hurried. He then goes to town leaving the mine without anyone in responsible charge. I am reminded of a superintendent's complaint that he had four men build a flume across a creek. He had to go to town. Before leaving he admonished his men to do a good job as he wanted to run the mill the next day and needed the flume to carry water. The next morning he asked if the flume was finished. One of the men assured him it was, so he sent him to the intake and told him to let the water in. When the flume was full it collapsed. Suppose men's lives had depended on that job? It would have been all the same. The superintendent failed to instruct the men how to build the flume. He failed to leave a man in responsible charge who would see that orders were carried out. He further failed to inspect the completed job before attempting to utilize it. The loss to the company was enormous, even if it consisted only of a few men's wages, several hundred feet of lumber and two days' delay in starting the mill. It is safe to assume that for every accident that happens to workmen because of inadequate supervision, there are many other types of accidents that never come to light but are frequently the deciding factor in the success or failure of a venture. Intelligent, resourceful and constant supervision is vital to the safety of the men and the success of any venture.

Educational processes must be emphatic and continuous if accidents are to be reduced to a minimum. This applies to employer and employe alike to a large extent. To ask for an alteration on the assumption that an accident might happen if the change is not made is a most unconvincing argument. I am frequently told that certain suggestions seem unnecessary because such accidents have never been experienced at that mine by that particular individual. Isn't it about time that we graduate from the school of bitter experience? Can't we accept the tragic experience of another person in another locality and apply the obvious lesson in our own case? Or must we invite a similar experience with more and unnecessary suffering before our own education is complete.

On the other hand you have the sad story of the injured man as he lies on his cot in the hospital. "Why I have done that that way all my life; I did not think that such an accident could happen to me." No, he did not think and what is perhaps worse his employer in all probability did nothing to awaken thought in him. In other words safety education was neglected.

Why should not an employer go out and determine causes of accidents in his particular industry and then take steps to prevent them in his own plant or mine. Most operators are more than willing to draw upon the operating experience of others and apply such experience to their own problems—why not do the same in accident prevention.

Why should not men be told with each new task they are given to do it safely or, to be careful. The only way we learn anything is either through painful or costly experience or constant repetition.

I think accidents ought to receive wider publicity. If a workman is killed

in the northern part of the state because he climbed over a fence and was caught in a transmission belt, why should not the miners in the southern part of the state be advised of the exact facts. Here in this state we have several excellent mine operators' organizations that could be instrumental in publicising the exact facts. Such publicity has an immense educational value. Accidents have a certain amount of news value. They cannot be hidden. It is far better that the true facts become known, than that a lot of misinformation get out.

Educating ourselves in the causes and prevention of accidents and educating our employes in proper job conduct is a responsibility of management.

I have discussed managerial attitude, supervision and education at considerable length because they are fundamental and without them a safety program cannot succeed. The next part of the program is comprised of specific methods of accident prevention.

To know how to prevent accidents one must of necessity have some knowledge of how accidents happen. Past records give us an excellent understanding of accidents. The following conditions with a brief discussion for each will give causes and remedies for the more serious types of accidents.

Blasting.	Gas.
Falls of rock.	Handling material.
Cave-ins.	Machinery.
Falls of persons.	Fires

Explosives should always be handled with great respect. They never should be allowed to stand in the direct rays of the sun. They should never be stored together with detonators. The magazine should be bullet proof and as fireproof as it can be made. It is advisable to use electric detonators in sinking and in wet ground. When fuse is used, same should be of ample length. It is difficult, if not unwise, to recommend a standard length of fuse for all mines. Where small rounds are the practice, I have recommended a minimum length of five feet and as much longer as safe practice may require. I do not approve of a practice quite general in the smaller mines, that of letting each miner cap his own fuse. I am reminded of several mines where missed holes run upwards of 10 percent of all holes blasted. Obviously there is something decidedly wrong. When missed shots occur with frequent regularity, an investigation should be made as to the methods of making primers, water at the working face, and the age of detonators and fuse. Superintendents or foreman can well afford to be particular in this matter. Blasting accidents generally result in deaths and permanent disabilities. Missed shots are a menace. They block progress and are costly. Twenty-five percent of all mine accidents in California in 1932 were the result of blasting accidents. The following table is taken from the U. S. Bureau of Mines Information Circular No. 6725.

TABLE 1.—*Fatal accidents in mining in California during* 1932.

Date of accident	Kind of mine	Number employed	Number killed	Cause of accident
Jan. 28	Gold mine	Over 50	2	Explosives (fuse and detonator blasting). Picked into missed shot in winze.
Feb. 13	Gold mine	Over 100	3	Explosives (fuse and detonator blasting). Stayed too long. Wet fuse. In drift.
Mar. 23	Gold mine	Less than 10	1	Caught in machinery on surface.
Mar. 30	Gold dredge	Over 20	1	Fell from dredge; drowned; on surface.
Apr. 12	Gold mine	Less than 10	1	Fell down shaft.
Apr. 12	Gold mine	Less than 20	1	Electrocuted. Signal wire charged (in winze) with 440 volts.
May 16	Gold mine	Over 100	1	Struck by falling timber. Underground.
May 27	Gold mine	Over 100	1	Fall of rock. Underground.
July 6	Gold dredge	Over 20	1	Electrocuted on dredge.
July 30	Gold mine	Less than 10	1	Explosives (fuse and detonator blasting) 7 holes. Carbide lamp extinguished. Stayed too long in winze.
Aug. 24	Gold mine	3	1	Explosives (fuse and detonators) in drift. Primer exploded, container fell, transporting same.
Sept. 14	Gold mine	3	1	Explosives (fuse and detonators) in drift. Stayed too long. Wet fuse. 2 holes.
Sept. 17	Gold mine	Over 100	1	Explosives (fuse and detonators), starting raise. Stayed too long. 15 holes.
Nov. 3	Gold mine	Over 100	1	Skip and shaft timber.
Nov. 19	Gold mine	Less than 5	3	Suffocated, lack of ventilation. Shaft.
Dec. 5	Gold mine	Less than 10	1	Fall of roof in drift.
Dec. 5	Gold mine	Over 50	1	Skip and shaft timber. Underground.
Dec. 28	Gold mine	Over 10	2	Killed by cave caused by blasting (fuse and detonators used). Underground.
		Total 24		

U. S. Bureau of Mines Information Circular No. 6725.

Falls of rock are frequent. Accidents from this cause vary in severity. This cause can be eliminated through proper supervision. Barring down is a laborious task and miners must as a consequence be constantly urged to do a thorough job of it. It is the boss' duty to see that the working place is barred down.

Cave-ins are not so common, but when they occur they usually result in fatalities. Cave-ins are generally the result of misjudgment of ground, the lack of or an insufficient amount of timber and too much open ground. Experienced supervision, good judgment and an ample supply of timber will prevent cave-ins.

Falls of persons is the cause of many accidents. Many of these falls are directly due to poor housekeeping; a few to employes' carelessness. The fatal falls, as in shafts or down raises, etc., are generally due to lack of guards. Again supervision can do much toward the elimination of accidents from this cause.

Natural gases can and do occur in metal mines and gas explosions have occurred. Nitrogen and carbon dioxide gas feeders have been found in metal mines and hydrogen sulphide is known to occur. Where the presence of gas is suspected, it is advisable to proceed very cautiously. The U. S. Bureau of Mines is equipped to give competent advice, and its aid should be sought.

There are other sources of gas that should also be given due consideration. Recently a mine was unwatered. Methane gas was found several days later distributed quite uniformly along the entire length of the main drift. The mine had been thoroughly timbered and had been flooded for years. When the water was pumped out the water soaked timber gave off the methane gas. Many old mines are being reopened. These mines have often been idle for years and have partially caved. When reopening such a mine the air inside is frequently found to be deficient in oxygen. Under such conditions the carbide lamp burns only with a reddish flame or is extinguished. A failing carbide light should be accepted as a warning of an unsafe atmosphere and ventilation should be provided.

The gasoline engine has been as helpful to the miner as to many other in-

dustries. The possibility of the exhaust gases getting into the mine should at all times receive due thought. Two cases present themselves. A gasoline engine-driven hoist was set up under a snowshed near the entrance of a mine. The natural air current was slightly incast. The exhaust fumes drifted into the mine where men complained of headache and nausea. In the other case a gas engine-driven compressor was set up adjacent to the portal of a drift mine. A low shed roof covered the equipment. The exhaust from the gasoline engine was directed upward through a short piece of 2½-inch pipe, but ended beneath the roof. The compressor picked up the fumes and sent them to the face through the air line.

These are typical cases. Other similar ones could be cited. The gasoline engine has made possible the re-opening of many mines that were abandoned years ago for want of cheap power. However, its deadly exhaust gases should not be underestimated as a source of danger to the miner and every effort should be made to prevent them from contaminating the mine atmosphere.

Handling materials is a prolific source of accidents. In severity these vary from numerous minor injuries to occasional permanent disabilities and fatalities. The minor injuries consisting of bruises, lacerations, and possibly fractured toes and fingers are, as a rule, the result of careless habits of individuals. Major accidents usually happen while moving heavy objects such as large timbers and machinery. When heavy objects must be moved the mine superintendent should see that the equipment necessary to move them, such as slings, ropes or cables, and timber, etc., is in good condition. Next he should put a competent man in charge who will see that all efforts are synchronized and that every man is in his proper place.

Machinery in motion is the cause of many accidents most of which are severe. Recently a man lost part of his hand when it was caught in the gears of a small gasoline engine-driven hoist. Another man was killed when he was caught in a compressor belt drive.

I am frequently told by superintendents and manager, when investigating a severe accident, that the accident happened because the man went where he had no business going. In many instances that is a true statement of fact, but that is not the only fact upon which a verdict of responsibility is placed. Someone installed that machinery and someone is responsible for its operation. It is a peculiar thing but whereever safeguards have been neglected or overlooked, they are generally installed in a hurry after an accident has happened. The vagaries of human nature must be taken into consideration. A man may have no business stepping through a belt drive but we all know if the opportunity to do so is presented, someone sooner or later will do so. The first time he does, the foundation of an accident is laid. It is then only a matter of time until unexpected circumstances alter the trend of events. Guards are required by law. They are also a moral responsibility irrespective of where a workman may or may not go.

Fires may start whereever inflammable materials accumulate or are gathered together. Fires have occurred in large and small mines. In the type of mines under discussion the fire hazards most generally consist of oil and grease accumulations in timbered areas, the carbide lamp, and poor electric wiring. In surface structures, gasoline storage, stoves, oil soaked rags, overheated machinery and gasoline engines may be added as causes of fires.

Recently two new mills were consumed by fire. One fire was caused by the electric wiring on a gasoline engine. The gasoline supply tank exploded and instantly the entire mill was engulfed in flames. The other fire was caused by the careless use of welding equipment. No men were injured in these fires but they are accidents nevertheless and were very costly.

A few years ago a surface structure near the entrance of a mine burned. Five men were in the mine. They could see daylight but were driven back by the smoke which finally killed them. The surface plant at a mine should be so laid out that inflammable structures are a safe distance from the mine entrance. Where such location is impossible because of the contour of the ground, the structures should be of fireproof construction. In areas of heavy winter snowfall snowsheds are frequently constructed between the mine entrance and other surface buildings. Such snowsheds may act as a passage through which the smoke is directed into the mine. Some means available for minimizing this fire hazard are: fireproofing of snowsheds, a fireproof door at the mine entrance, and one or more smoke vents of ample size along the roof of the snowshed.

Protective clothing such as safety type hats and shoes are important adjuncts to any plan of accident prevention.

The new safety type hat is light, well-ventilated and comfortable. It has prevented many bad accidents and should be a part of every miner's personal equipment. I am reminded of two miraculous escapes from certain death. In the one case a man fell down a raise head first for a considerable distance. His hard hat was crushed. His only injury was a slight stiffness of the neck. He was back to work two days after the accident. In the other case a man was hit a glancing blow on the head by a rock that weighed about 200 pounds. Again the hard hat was crushed. The wearer suffered a bad laceration and bruise on his left shoulder. The safety hat certainly prevented a fractured skull.

Similarly safety type or hard-toe shoes have prevented many mashed and fractured toes. A young man had passed the entrance examinations to Annapolis. He worked in a boilershop during his summer vacation. There was a rule that all shopmen wear safety type shoes. He was helping on the fabrication of structural iron when a piece weighing about 500 pounds fell on his foot. The hard-toe cap was dented but his toes were uninjured. An ordinary shoe would undoubtedly have resulted in the loss of his toes. In this case safety type shoes saved a young man's career. Safety type shoes give excellent protection to feet and toes and are a definite protection against all kinds of toe accidents. Their use should be encouraged.

A knowledge of first aid is absolutely essential in mining. We are far removed from that desirable goal of no accidents. So long as accidents occur, mines should be equipped to render first aid. The frequent report of infections of minor cuts and scratches indicates that closer attention should be given to this type of injury. The employe often feels that a superficial wound is entirely too inconsequential for a first aid dressing. He promptly forgets it—only to be painfully reminded a few days later that an infection has set in. The employer should insist that all injuries be reported to him or his authorized representatives.

The U. S. Bureau of Mines employs competent instructors in first aid. Their services are free for the asking. The Bureau also publishes a handbook on first aid to the injured. Mining companies should avail themselves of this indispensable service.

In this brief review of causes of accidents it is apparent that we must look to the mine operator to do his full share of accident prevention work, before we can hope to get very far, and even then he is not through. There still remain those accidents more or less strictly attributable to carelessness but which in reality are the result of unaccountable pranks of human behavior. Who but the employer or his bosses is there to try and outguess the next outburst of misdirected action? How can we curb these freakish acts of otherwise sober men? There is but one answer—by education; by educating ourselves and our employes.

We have learned much about accidents and their prevention but we have not learned fast enough nor have our lessons always been as lasting as they should have been but we are encouraged by the fact that the trend is in the right direction. We still have a long ways to go. I have discussed accident prevention with hundreds of gold mine operators. The spirit of cooperation is there and a better safety record is in the making.

R. J. Burmeister, general manager of the Raleigh Coal and Coke Company, was elected president of the West Virginia Coal Mining Institute at its recent meeting held in Fairmont, W. Va. Other officers elected were **E. B. Agee**, Dehue; **Dunlap Brady**, Morgantown; **Carel Robinson**, Ward; **William J. German**, Pocahontas; **F. F. Jorgensen**, Fairmont; and **N. P. Rhinehart**, Charleston, vice presidents; **Charles E. Lawall**, Morgantown, secretary-treasurer.

Efficiency in Use of Electrical Power in Coal Mines

By C. C. BALLARD*

TO GET efficiency in the use of electrical power in and around coal mines, the watchword between the electrical department and the operating department should be "Cooperation."

The electrical department must know its equipment, what it will do efficiently, and must be prepared to make recommendations to the operating department as to the operating hours that will give the best load factor and the maximum output of coal. The operating department, for its part, should cooperate in scheduling haulage trips, in pumping hours, and the like.

Among the best methods that may be employed to gain efficiency in the use of electrical power the following may be listed:

1. Meter all circuits and keep a power distribution record of each month's performance.
2. Distribute the load over the 24-hour day as much as possible.
3. Keep a record of all feeder circuits.
4. Sectionalize the mine feeders.
5. Test and keep records of drainage and ventilation.

By metering all circuits and keeping a power distribution record of each month's performance as indicated in Figure 1, the power consumed can be checked, month after month, on ventilation, town lights, pumps, hoist, and the total D.C. power used for haulage, cutting, and gathering pumps, along with the tonnage output of the mine. The management of the operation can determine, after a few minutes' study of this type of a report, if it is getting the maximum of efficiency from its electrical power.

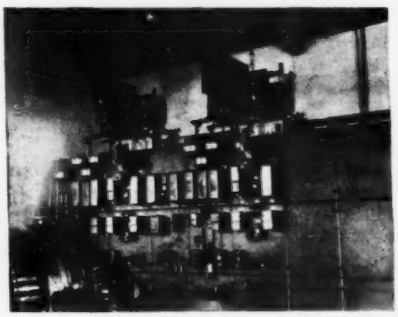
Similarly, distribution of the load over the 24-hour day is very important. By this means the demand can be controlled and a very good load factor obtained at most mines. Cutting of coal can be done on the "off-peak" load, without losing any tonnage of coal. If proper management is exercised inside the mine, the main pumping can be done on the "off-peak" load, too; and in some cases the sump used for storage can be made larger, or larger equipment installed. In the majority of instances, money spent to reduce demand will pay large returns.

* Master Mechanic, The New River Company.

Where two or more locomotives are used in the same haulage-ways, the number can often be reduced; that is, the number hauling simultaneously.

Automatic signal systems can be used to good advantage. By allowing only one locomotive on the heavy grades of the haulage-way at any one time, a few kilowatts may be saved on demand that will soon pay for such control devices.

Various forms of demand limiting devices have been used around mines, penalizing one or more circuits by cutting off the current the moment the demand



Front View of Automatic Control Switch Board Showing Blank Panels for Future Equipment

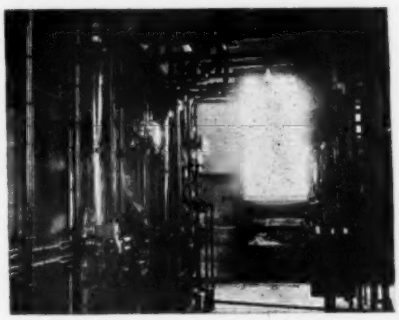
reaches a pre-determined peak. This type of limitation is mechanical, and I believe that the best results may be obtained by careful study in collaboration with the operating department — the careful scheduling of equipment operation—without the demand-limiting device which often slows production by penalizing an innocent circuit.

Feeder circuits in and around coal mines should be checked and a record kept of them. In the town lighting circuit there should be the best distribution possible, all houses metered, and transformers well loaded to reduce losses to the absolute minimum.

Feeder lines inside the mine should be indicated on maps of the operation, with their sizes, and the load location should be shown for each section of the mine where that can be easily determined. Some men around a mine give more attention to the positive feeder than to the negative line, or the return circuit, whereas, the latter should have the same attention that is given the positive line, so far as carrying capacity is concerned. In many mines the largest per cent of line losses is in the negative circuit, the result of using too small bonds, or too small rails to carry the current. Bonding should be checked with a reliable type of bond tester once each year, and all bonds showing a foot or more of extra resistance should be replaced or another bond added. This is very important on main lines carrying current from several sections.

There is a limit on the distance of the load from the substation for efficiency in the use of electric power. This condition must be handled according to the size of the property to be mined, and the life of the mine must be considered. In many cases the substation can be advanced or another station added at the advance workings; automatically controlled machines may be placed on the outside with feeders going through drill holes into the mine at the load centers, making a very desirable and economical layout.

Sectionalizing the mine feeders by the use of a good, reliable type of automatic



Rear View of Automatic Switch Board

circuit breaker will do much to enhance the efficiency of the use of electrical power and the general operation of the mine. By confining such troubles as develop from overloading of locomotives, electrical break-downs on mining machines, pumps, and trolleys down, to one section of the mine, the entire operation need not be affected by the abnormal condition; the circuit breaker in the sec-

POWER DISTRIBUTION FOR ONE MONTH

Mine	Hoist	Fan	Tipple	Lights	A.C. Pumps	D.C. Power	Demand	Total KW.H.	Load Factor	Tonnage
	38,080	27,540	7,680	7,270	87,460	117,670	864	285,700	46%	34,459
KW.H. per ton	1.105	.799	.022	.021	2.538	3.414	...	8.3	....	.....
Percent of total	13%	.09%	.03%	.03%	31%	41%	...	100%	....	.....

tion affected will open the circuit and hold it open until the trouble has been corrected. It certainly is not in the interest of efficiency to have an entire mine "down" because of trouble in one section; a considerable amount of extra power—"wasted power"—is required to get equipment to moving again after a shutdown.

Testing pumps and fans, with records kept of all tests, will reveal which pumps and fans are delivering their maximum output.

There are several mines in Southern West Virginia in which drainage consumes from 30 to 45 per cent of the total power used by the particular operation. Since so many things may occur to lessen the efficiency of pumps—corrosion of pipe lines, clogging of pipe lines by chips of slate, or foreign objects of other kinds lodging in the lines to decrease their area and thereby heighten friction—their regular testing, and the keeping of records year after year, will reveal the development of any undue friction, and make possible its immediate correction through removal of the cause.

The following table may suggest a way of keeping a pump test:

Pump No. 6760; 600 g. p. m., 1,800 r. p. m., 583-ft. head; 8-stage centrifugal; motor 125 h.p., 1,800 r.p.m., 2,200 volts. Synchronous type. Motor efficiency, 91.3 per cent.

Pipe intake 60 ft. 6 ins.; 2 90-degree ells. Static lift, 8 ft.

Discharge 25 ft. 6-in. pipe and 560 ft. 8-in. pipe. Three 90-degree ells; static head 538.5 ft.

Test—100 k-w input at motor. Working head, 550 feet; water output, 600 g. p. m., measured with water vacuum 14.8 ft.

Discharge pipe friction loss, 11.5 ft.
Intake pipe friction loss, 6.8 ft.
Efficiency of pump, 69.8 percent.
Efficiency overall, 63.8 percent.

If a record similar to the above is kept and a test made each year, any undue friction occurring or any drop in efficiency can be quickly found, and money spent in correction will be well spent.

I have touched only on some of the highly important points involved in the use of electrical power in and around coal mines, and in a practicable way. Tables may be easily obtained covering technical points not covered herein; many text-books and mine supply catalogues will show the size of copper needed for the load and distance required, tables giving sizes of pipe lines, motors, pumps, hoists, and other equipment required in mining coal.

Fire-Proof Building of Automatic Sub-Station

Automatic Sub-Station, 300 K. W. Motor Generator Sets

I have tried to stress the important points of keeping a record of power, feeder circuits, and pump testing. In a well-managed mine complete data on costs of labor, yardage, and mining are kept; if there are not the same complete data on power costs, distribution record and equipment costs, I do not believe an operation can be made to function at its potential efficiency.

FIGURES FURNISHED by the American Railway Association to the U. S. Bureau of Mines show shipments of anthracite into eastern New York and New England for the week ending August 18 amounted to 1,058 cars, as compared with 4,258 cars during the same week in 1933, showing a decrease of 3,200 cars, or approximately 160,000 tons.

Shipments of anthracite for the current calendar year up to and including the week ending August 18 have amounted to 66,300 cars, as compared with 46,111 cars during the same period in 1933, showing an increase of approximately 1,009,450 tons.

Shipments of bituminous coal into this territory during the week ending August 18 have amounted to 1,724 cars, as compared with 2,323 cars during the corresponding week in 1933. Calendar year shipments of bituminous coal have amounted to 70,343 cars, as compared with 60,096 cars during the same period in 1933, indicating an increase of approximately 612,350 tons.

A comparison of the weekly shipments of anthracite and bituminous coal since and including the week ending August 4, with calendar year totals for the previous year's shipments to August 18, is given in the following table:

Week ended	Anthracite 1934	Anthracite 1933	Bituminous 1934	Bituminous 1933
August 4	1,872	921	1,384	2,180
August 11	1,220	734	1,799	2,023
August 18	1,058	4,258	1,724	2,323
Calendar year to Aug. 18, 1934	66,300		70,343	
Corresponding period, 1933	46,111		60,096	

THE OUTPUT of by-product sulphuric acid at copper and zinc plants in 1933, in terms of 60° acid, amounted to 656,102 short tons, of which 301,075 tons were produced at copper plants and 355,027 tons at zinc plants. At zinc plants, 64,984 tons of sulphur were used to supplement the gases derived from the roasting of zinc blende, and 242,493 tons of sulphuric acid were produced therefrom. No sulphur was used at copper plants.

In 1932, 600,334 tons of by-product sulphuric acid were produced. Of this amount, 258,994 tons were recovered at copper plants and 341,340 tons at zinc plants. Sulphur amounting to 65,510 tons was used at zinc plants for the recovery of 244,644 tons of sulphuric acid.

More complete information and statistics on production of by-product sulphuric acid in 1933 are given in the chapters on "Zinc" and "Sulphur and Pyrites" in the "Minerals Yearbook 1934," about to be issued by the United States Bureau of Mines, and which may be purchased about August 20 from the Superintendent of Documents, Government Printing Office, Washington, D. C.—*By H. M. Meyer, Mineral Statistics Division, O. E. Kiessling, Chief Economist, United States Bureau of Mines.*

FOLLOWING a recent meeting of the Board of Directors of the Westinghouse Electric & Manufacturing Company, President F. A. Merrick announced the election of three vice presidents, Roscoe Seybold, formerly comptroller; William G. Marshall, formerly assistant to vice president; and Ralph Kelly, formerly director budgets.

Modernizing An Old Mine

By C. E. SWAN*

THE Union Pacific Coal Company's "C" Mine Slope, located at Superior, Sweetwater County, Wyoming, was started in February, 1906, on a 7 to 8 foot bed of clean coal which had a dip of about 7 per cent to the northeast. The floor was sandy shale and sandstone and the roof strata immediately above the coal was a sandy shale strata about 30 feet thick. Above the water level the shale above the coal formed an excellent roof but as the water level was passed this roof became progressively bad as the workings were extended to the dip.

The mine was developed as a hand loaded room and pillar mine with entries turned north and south off the slope at regular intervals. Rooms were turned off these entries up the dip parallel to the slope line.

Below the 6th South Entry on the south side of the mine a panel system of mining was established with panel planes driven up the dip at 600-foot intervals along the south entries. Rooms were turned off each side of these panel planes and the rooms were driven approximately along the strike line. The panel system of mining in this mine proved a satisfactory system until a cover of approximately 600 feet was reached where roof troubles developed and an excessive timber cost of from 25 to 40 cents per ton of coal mined resulted. Part of this heavy timber cost resulted from the necessity of retimbering rooms before completion because of the slow extraction of coal by hand methods. This system of mining also aggravated the system of roof control in that a definite breaking line for pillar recovery could not be maintained over an extended area along the strike.

During 1925 the management of The Union Pacific Coal Company became interested in experiments being made in the mechanical loading of coal as it was realized that some new system of mining must be evolved for producing coal if the coal companies were to remain in business and be able to produce coal at a cost which would net a profit to the producing company.

Competition from other sources of power, notably oil and gas, had steadily increased and combining this with the overdevelopment of mining properties incident to the World War strongly emphasized the fact that the coal mining industry had not kept pace with the other basic industries.

Practically all basic industries except coal mining had become intensely mechanized, were employing multiple shift, with mass production common practice.

Shaking Conveyor Working in Bad Roof Conditions. Rooms 22 ft. wide, Using 20 ft. Cross Bars and Four Legs

Mr. McAuliffe, President of the Union Pacific Coal Company, in compiling data for his book, *"Railway Fuel,"* published in 1927, became thoroughly convinced that the coal industry must go to mechanical loading and the multiple shift in order to survive. Members of the operating and engineering staffs of the company who were cooperating in the preparation of this data realized the possibilities which might be obtained by the use of mechanical loaders. The next step was to find a mechanical loading machine which might prove successful when working on pitching seams where the cover would increase rapidly when the mine workings advanced down the dip.

During 1925 members of the operating and engineering staffs of the coal company visited a number of coal mining properties where experiments were being made with mechanical loading machines of different types to determine if any of these machines were practical for loading coal on pitching seams such as were being operated by The Union Pacific Coal Company.

These visits disclosed that many of the machines being operated on flat seams with fairly good results would be totally impractical when used on steeply inclined seams of coal. It was decided that the scraper loader and also the shaking conveyor which was being operated in European mines with good results had the best chance of proving successful on Union Pacific System mines.

The first attempt to load coal at The Union Pacific Coal Company mines by the shaking conveyor method was tried out at "C" Mine, Superior. In the fall of 1925 a block of coal was selected for the experiment. This block was split by driving a pair of narrow places up the hill connecting with the entry above. It was then planned to recover 100 to 150 feet of the pillar on each side by slicing the pillar along the strike line. This required the use of a shaking conveyor in one uphill place as a haulage unit with shaking conveyors as feeders, driven at

Universal Duckbill, "C" Mine, Superior, Loading in Room, 8 percent Pitch

right angles off each side of the haulage conveyor by bell cranks and rope drives or some other method.

Loading coal by hand on the face conveyors soon appeared to be an inefficient method for mechanically loading coal which more or less offset the good results

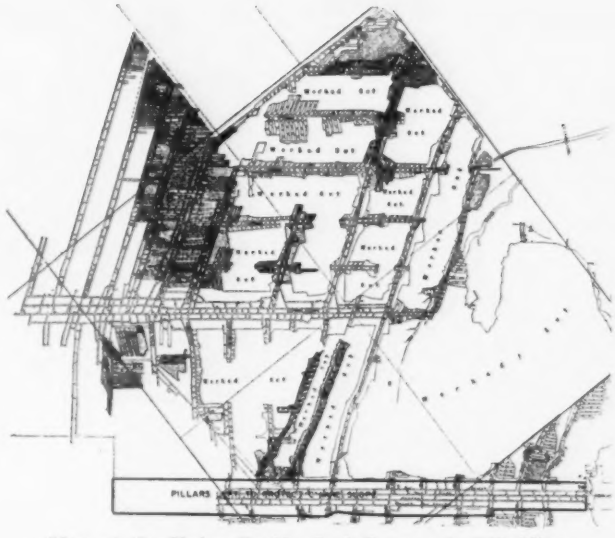
* Chief Engineer, Union Pacific Coal Co.

which might be obtained from the use of shaking conveyors, and in order to obtain the maximum usefulness of the shaking conveyors, some method for mechanically loading the pans was essential. Our first shaking conveyors were of the German Eickhoff Company make. The Eickhoff Company had a loading head attached to a telescopic pan and the extension of the loading head into the coal pile was accomplished by laborious hand methods. This loading head was tried out and its usefulness had such a limited application that mechanically minded men on the job began experimenting toward making the shaker not only a conveying device but also a practical combined conveying and loading unit. Trials were made of several ingenious devices from which developed the "McCarty Duckbill Loader", with a hand operated ratchet mechanism by which the loading head could be quickly and easily slid under the coal pile and the hand shoveling almost eliminated. This loader was the forerunner of the perfected "Universal Duckbill Loader", now in general use in The Union Pacific Coal Company Mines.

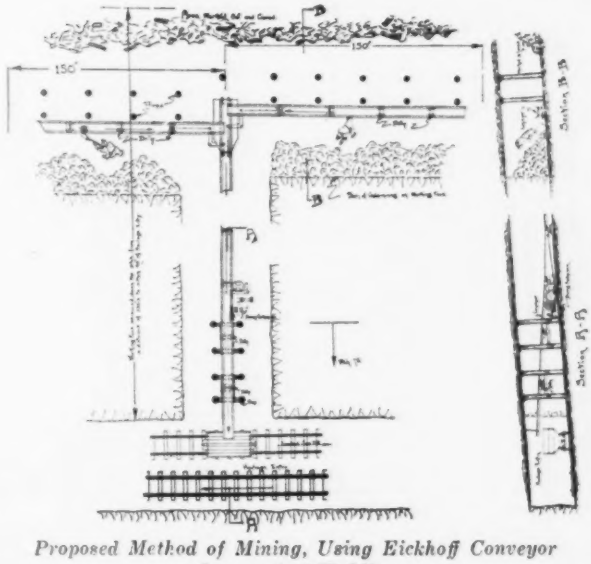
The experimental system of mining and mechanically loading the coal described above soon developed difficulties. In addition to troubles found with side drives (which have since been overcome) and the unsatisfactory hand loading of the conveyors, roof troubles developed as soon as any large area was worked out with rock falls passing over the face timbers, spoiling the working face and making the recovery of the working face an expensive process. The above method of working the coal at this mine was abandoned after a thorough test and an advancing room and pillar system of shaking conveyor mining established.

A very bad roof condition existed at this mine due to the type of roof, heavy cover, and the many blocks of coal only partly removed in the upper hand worked portion of the mine. These conditions formed a combination which carried the roof stresses over the lower workings. The roof contained thick strata of friable laminated shale which is exceedingly difficult to hold up. After trial at Superior "B" Mine, it was found impracticable to operate scrapers where this type of roof existed.

It was suggested that a three entry system of mining be tried out in which the center entry was to be driven wide and allowed to cave with the hope of relieving the roof stresses over the virgin territory to be mined. This system was not attempted but in its stead a pair of entries was driven to a property line and an experimental section laid out for a trial retreat shaker conveyor room and pillar system of mining. This system of mining is now common practice at the Superior mines and is giving excellent results both from an operating and cost standpoint. A system of working a number of shaking conveyors loading on a transfer conveyor with a single loading head is being established at this mine to assist in concentrating the live workings to a minimum of area and reduce haulage costs.



Map of the Union Pacific Coal Company's "C" Mine, No. 1 Seam, Superior, Wyo.



Proposed Method of Mining, Using Eickhoff Conveyor for ore in "C" Mine

The retreating room and pillar system of mining by the use of shaking conveyors has shown in this mine that we can successfully mine territory, at a profit, whereas if slow hand loading methods were still in use it would have become necessary to abandon the mine on account of high cost operation.

MR. J. J. RICHARDS has been appointed manager of Link-Belt Company's vibrating screen department, succeeding Mr. Harry L. Strube, who has been promoted to the position of assistant chief engineer of the company's Philadelphia plants.

WM. BEURY, of the Algoma Coal and Coke Company, Algoma, W. Va., together with T. L. Felts, Bluefield; John J. Fox, Bramwell; and W. O. Tracy, Bluefield, left on October 19 for a big game hunt in Ontario, Canada.

A NEW and completely revised edition of "Precautions and Safe Practices" is now being offered by the Linde Air Products Company, 30 East 42nd Street, New York, N. Y.

Since the original publication of this booklet several years ago, it has come to be accepted as the standard reference work on this important phase of safety in industry, as attested by the thousands of copies that have been distributed.

Wheels of Government

THERE are rather definite indications in Washington that business is "wooing" the administration rather than the other way about. The situation has been brought about by the election, needs explanation, and is important in showing a probable trend in national affairs.

First, there seems little doubt that the election has changed the policy that industry has held toward the administration. That change has been toward a warmer feeling for the administration with the idea that it will be the only bulwark against so-called "radical" legislation and drastic proposals by a Congress apparently imbued and pledged to spending back to prosperity.

Important administration officials have made it known that strong assurance has come from leading industrial figures that a program of adding jobs and thus cutting relief will be embarked upon at once. Thus is apparent the anomaly of the group only a short time ago opposed to Rooseveltian policies now embracing them as the surest means of preventing large tax increases, possible inflation, drastic social legislation, principally unemployment insurance and possible shorter work week.

Those intimate with the Washington scene see in this shift in policy not only a notable achievement by the Democratic administration, but carrying vital portent for the future.

Talk of the administration shift to the "right" and more conservative policy is undoubtedly true, but also undoubtedly overstressed. There is no disposition to relax the movement to make the Federal Government a continually more important factor in the regulation of various businesses and industries. Notable in this regard is the power policy, a program sounded by the President when governor of New York and amplified in his campaign addresses, which indicates not only a unified national power policy, but the most serious threat to this particular branch of private business now visible unless noteworthy changes in rate structure with attendant emasculation of huge holding companies are made. The same picture looms in the railroad problem and in many natural resource industries, although the latter can envision a far more favorable outlook.

In this connection recommendations of the Administration Natural Resource Committee, which are to go to the President this month, may lead to some remedial legislation, particularly in so far as greater Federal interest in these industries are concerned.

The whole movement of industry and business toward a more favorable feeling for the administration is based on the premise that there is not apparent an immediate political reaction against the present policies. A strong note for Federal control was sounded by no more important an opponent of such regulation than Richard Whitney, president of the New York Stock Exchange, who extolled the Security Commission's regulation of exchanges after one month of such control.

Best opinion here is that the administration is perfectly willing and even eager that private industry get in and "get somewhere." The feeling is that the way has been paved for better times, and if industry continues to hold back, other means will be taken to insure permanent recovery.

But at the same time there are no guarantees nor even the tiniest indication that the administration will not continue to plan for the future and proceed to carry out those plans. As they now stand, some of them only ghosts and scarcely visible, they aim toward a planned economy for the nation with private industry in charge under Federal regulation and control. There may be shifting and change in these plans, but those who chart the course and are acquainted with the intended voyage predict that should Rooseveltian policies dominate until 1940, it will make little difference who then succeeds to the scepter. The way will have been lighted, and so sanguine are the prophecies that those who follow will have little choice in the matter, declare the prophets now. These matters and opinions discussed here are the concensus of current feelings in Washington now and are interesting only in so far as they may help interpret the future of administration policies and actions.

Meanwhile there is concerted activity along the lines of social legislation, particularly unemployment insurance; discussions by legislative and executive committees on tax matters (tied in with unemployment insurance); apparent decision to strengthen national defense; definite action seeking reapproachment on trade matters with European countries tied in also with possibilities of currency and monetary stabilization.

Definite ruling on the industrial store scrip matter may be made some time this week by the NIR Board.

Activity by the A. F. of L. and other labor groups the past two weeks indicates not only an active lobby toward support of social legislation measures, particularly the 30-hour week and unemployment insurance measures, but also a drive toward concerted recruiting of union strength in many industries, with the steel as the immediate objective.

The recent resignation of Dr. Roswell Magill, Columbia University professor, as special assistant to the Secretary of the Treasury on taxation matters indicates the completion of his report on taxation, following a survey abroad as well as in America.

In this connection a summary of reports from the Treasury Department, the Ways and Means Committee of the House, the Senate Finance Committee, and the Joint Committee on Internal Revenue is interesting.

There is very little likelihood that a complete revamping of the Revenue Act will be undertaken. In fact, the trend is to avoid any major tax changes or increases. Advices come from some Congressional quarters that if modifications do come, they will provide rate changes, probably increases, but these are not expected to be either many or drastic.

One possibility is the discontinuance of the manufacturers' excise taxes which expire next June. However, there are some indications that reenactment of

these levies, which approximate $425,000,000, will be sought.

This much appears fairly certain: the tax demands will depend in good part on the President's budget message. If he demands a balance of the budget, heavy taxes may be forced. If he does not demand a balance, the tendency will be to leave the tax picture as nearly unchanged as possible to avoid disturbing business.

Discussion is heaviest on unemployment insurance, some plans for which would provide Federal contributions. In all probability there will be a veering away from the Wagner-Lewis bill of last year, which placed the whole burden on industry. The most probable plan will be a variation of a three-way ratio system similar to those in operation in some European countries at the present time, industry, labor, and the Government representing the three sources of funds. This ties in with the Federal tax picture in that it could occasion an additional tax to raise unemployment insurance funds.

In studies made abroad last summer, it was discovered that the British system functions under a much more strict administration than ours, that is, the tax system. There was some feeling that the English study would result in income tax increases here, but the result is taking another turn instead, a turn toward a hard and fast application of the tax laws, toward an iron-clad collection, even toward an extreme pressure for collection of back taxes.

There seems little question now but that the tax question is settling into an administrative problem, that the approach, for a while at least, will be to apply the laws aggressively, to avoid any openings for tax dodging, to see that all moneys come into the Government that under the law are intended for it. This may even be done without any further legislative authority, as most of the necessary authority already is invested in administrative circles.

The feeling is that most loopholes in tax legislation were effectively closed during the last session of Congress and that action this year should be directed primarily towards putting into effect the machinery built by such legislation.

Among rate changes which may come up in the next session is that on corporations. Indications are that the changes, if any, will be comparatively minor. Their exact nature remains uncertain.

House Ways and Means Subcommittee appointed to study unemployment insurance is to meet December 3, and the Senate Finance Committee some time during December. The House Ways and Means Subcommittee on taxation also is to meet early in December.

In connection with Dr. Magill's resignation, the Treasury made known that the work of tax legislation will be carried out by the staffs of the Treasury and the Internal Revenue Bureau under Robert H. Jackson, assistant general counsel of the Bureau, and Herman Oliphant, Treasury general counsel.

JAMES WHITCOMB RILEY—BORN THIRTY YEARS TOO SOON

OH, MA!
AAA BONUS
OH, IT SETS YOUR HEART ACLICKIN' LIKE THE TICK OF MANY CLOCKS WHEN YOUR CROPS ALL TAKE A LICKIN' BUT YOUR CHECK IS IN THE BOX.

—The Tulsa Tribune

Tied in with the taxation problem is that of the social legislation question. Indicative is the fact that while in the last Congress such bills as unemployment insurance and 30-hour week were solely the problem of the respective labor committees of the two Houses, this year both the Senate Finance Committee and the House Ways and Means Committee will hold hearings on the unemployment insurance question.

If anything, this would indicate that the Federal treasury will be a factor in any unemployment insurance plan enacted. Although the Administration Committee on Economic Security is due to make its report and recommendations on social legislation to the President on December 15, there is still no definite indication whether it will advocate the pooled system of unemployment insurance, wherein labor, industry, and the Government contribute to an insurance fund; or the employment assurance system, in which the employer is the only contributor, similar to the Wisconsin state plan. Labor so far has expressed a decided preference for the latter. It is interesting that the Deane plan also follows along that line. Possibilities are, according to present indications, that the administration plan is likely to be a compromise with some means of caring for the huge unemployed army now existent.

Meanwhile a decided trend toward reemployment is evident in industry in an effort to take as much ammunition as possible from the proponents of extensive unemployment plans, likewise saving further huge drains on the treasury.

Sand & Gravel in 1933

THE total sand and gravel reported as sold or used by nearly 2,000 commercial producers in the United States in 1933 amounted to 66,106,472 short tons, valued at $39,395,027, a decrease of 22.5 percent in quantity and 17 percent in value from 1932. In addition, production of sand and gravel from more than 550 state, county, and municipal operations was reported to the Bureau of Mines; the quantity of this material totaled 41,648,877 short tons and the value $13,677,883, increases from 1932 of 19.9 percent and 36.3 percent, respectively. The total output of sand and gravel accounted for in the canvass by the Bureau of Mines for 1933 was therefore 107,755,349 short tons, valued at $53,072,910. Because of the sharp increase in production reported by noncommercial agencies, this total is slightly higher than the preliminary figure of 104,000,000 short tons released by the Bureau early in 1933. The output reported by commercial plants, however, was 6.9 percent lower than that indicated by preliminary data.

Complete statistical coverage of sand and gravel production by states, counties, and municipalities is impossible without a large expenditure for field work. For 1933, however, a special attempt was made to canvass every local Government agency, and, as a result, returns from many additional counties or municipalities are included in the total of $41,648,877 short tons of material included under noncommercial. Returns from only those sources comparable to 1932 indicate that noncommercial production in 1933 was virtually equal to that in 1932; the increase in 1933 can be attributed directly to more complete statistical coverage.

Less than one-third—8,057,448 short tons in 1932 and 13,645,409 short tons in 1933—of the sand and gravel produced by Government agencies is washed, screened, or otherwise prepared to make it comparable in quality with the output of the average commercial plant. By far the larger part consists of pit-run material having a low unit value. The average value of all noncommercial sand and gravel in 1933 was $0.33 a ton, contrasted with $0.60 a ton for the commercial output.

All railroad ballast is included in this report under commercial production. In 1933, 1,232,795 short tons of ballast gravel, valued at $0.20 a ton, was produced by or directly for the railroads for their own use. This quantity is equivalent to 22.7 percent of total ballast gravel.

The percentage of prepared material included in the total for sand and gravel dropped to 66.9 percent in 1933, principally as a result of the increase in quantity of unprepared material reported by Government agencies. This prepared sand and gravel (72,058,631 short tons) includes only 13,645,409 tons contributed by noncommercial sources. Prepared material in 1933 comprised 88.4 percent of commercial production but only 32.8 percent of the noncommercial output.

Producers were asked to report the method of transporting their product during 1933. Replies received covered 98,482,383 short tons—91.4 percent of the total recorded production of sand and gravel. Of this quantity, 8 percent was transported by waterway, 32 percent by rail, and 60 percent by truck.

MINING EVENTS

Gold and Silver

TOTAL gold production in the United States increased nearly 40,000 fine ounces in 1933 over the previous year, according to figures assembled by the Bureau of Mines. Based on the statutory value of $20.67 a fine ounce, the value of the 1933 production was over $52,000,000 for the total of 2,552,459 ounces. California remained as the largest producer with 600,800 ounces; South Dakota produced 512,403; Alaska 457,274 ounces; and Utah 109,000 ounces. The 13 Western States and Alaska were the leading producers. The Philippines were also important factors with a total production of 279,534 ounces, an increase of 35,000 ounces over 1932.

Production of gold in Ontario Province, Canada, has shown a marked increase during the current year compared with 1933, according to a report to the Commerce Department from Commercial Attache H. M. Bankhead, Ottawa.

Gold production in the Province during the period January-September, 1934, was valued at $52,298,353, compared with $37,047,850 in the corresponding period of last year. The mines from which this gold is produced are in the Porcupine and Kirkland Lake belts and in northwestern Ontario.

Production of gold in Australia has continued to increase during the current year, according to advices to the Commerce Department.

Official figures just issued show that during the first six months of 1934 the gold output of the Commonwealth amounted to 428,112 fine ounces, valued at £3,580,252, compared with 387,985 ounces, valued at £2,912,562 in the corresponding period of 1933. For the full year 1933, total production was 830,000 ounces, valued at £6,406,069, compared with 714,000 ounces, valued at £5,211,512 in 1932.

WHILE the Chinese silver tax has been effective in halting silver shipments from the Orient since October 15, large purchases are being made in Mexico and in Europe, it is believed.

No announcements on the silver program are to be had at the Treasury, but well informed sources are authority for rumors that important announcements in connection with silver should be forthcoming before long. There is also indication that there will be legislation introduced in the next Congress affecting further the white metal. This is believed to be in connection with possible changes in monetary matters.

There has been further confirmance of the talk that a price increase for the newly mined domestic product is possible shortly.

The Chinese Minister of Finance has ordered a change in the manner of levying the equalization charge on silver exports, according to a radiogram to the Bureau of Foreign and Domestic Commerce from its Shanghai office.

Since the inauguration of this tax on the 15th of October, it was collected as of the date of clearance of the vessel carrying the exports, it is pointed out. Hereafter it will be collected as of the date of the custom export application.

In explaining the reasons for the change of policy, the Finance Ministry stated: First, it desires simply to check the outflow of silver as a result of speculation; second, China intends to maintain the silver standard; third, it is the policy of the Government to supply banks with suitable cover in the event of heavy demand for foreign exchange.

The Ministry has also announced that the surtax of 10 percent and the conservancy tax of 3 percent levied on silver exports is calculated as a percentage of the custom duty, and not of the equalization charge referred to above. According to the present announcement, the surtax is 10 percent of the duty and the conservancy tax is 3 percent of the duty (heretofore the conservancy tax was 4 percent). The equalization charge, states the Finance Ministry, is not refundable in case the export shipment concerned is withdrawn. The Ministry's present decision, it is understood, is based upon the recommendation of the newly-created stabilization committee.

The equilization charge on silver exports for October 30 was 8 percent.

It is understood that no shipments of silver have been made since October 15, when 1,000,000 yuan left Shanghai.

The Chinese Government's equalization charge on silver exports was dropped to 7.5 percent for October 31.

THE UNITED STATES Geological Survey has recently prepared four sets of maps showing the geology of extensive mine workings in the silver and gold mining district at Tonopah, in Nye and Esmeralda Counties, Nev. These maps have been deposited at the Geological Survey offices in San Francisco, Calif. (Customs House Building); Salt Lake City, Utah (Post Office Building); Washington, D. C. (Interior Department Building), and at the office of the Nevada State Bureau of Mines, Mackay School of Mines, Reno, Nev., where they may be consulted by the general public.

These maps are hand-colored photostat copies of office maps showing results of a resurvey of the Tonopah district made in 1929 and 1930 by the Geological Survey in cooperation with the Nevada Bureau of Mines. They have been made available to the public in this form in advance of their publication by the Geological Survey, because of the considerably increased interest in the silver-gold ores at Tonopah resulting from higher prices for gold and silver. Individual maps in each set show the geologic formations exposed in the mine workings for each 100-ft. vertical interval explored by mining operations. The maps are believed to provide a basis for the intelligent prosecution of a search for new ore bodies.

A description of the different formations and of the relationships of the ore bodies, based upon the resurvey, was published in 1930 as University of Nevada Bulletin, Vol. 24, No. 4, entitled "The Underground Geology of the Western Part of the Tonopah Mining District, Nevada." This report should be read in conjunction with any study of the maps. The report also contains a block diagram of part of the district, which shows in three dimensions many of the geologic features shown on the individual maps.

Copper

PRELIMINARY data on statistical changes in the world position of copper were released November 16, showing that United States stocks of refined metal had decreased 11,500 tons, as against an increase in foreign stocks of 4,250 tons, for a net world decrease of 6,250 tons, as reported by the *American Metal Market*.

At a meeting held in Washington, NRA officials decided to review the secondary copper production totals for the purpose of adjusting any possible inconsistencies that may exist in the allotments given to the custom smelters under the copper code. The review was decided on as a result of protests from members of the industry against existing quotas, particularly as a result of a request filed on behalf of Nichols Copper Company that its current quota of 2,200 tons monthly be increased.

Managing Director H. O. King, of the Copper Code Authority, has released a list of concerns who have signed buying agreements. The list comprises about 100 consumers and about 25 dealers or producers of copper or ingot metals.

THE NRA announced its recognition of the following Code Authority memberships:

Copper, brass, bronze, and related alloys trade (division of the wholesaling of distributing trade) Members of associations—C. H. Krueger, Chase Brass & Copper Co., New York, N. Y.; Joseph Stelwagon, Stelwagon Manufacturing Co., Philadelphia, Pa.; and J. J. Whitehead, Whitehead Metal Products Co.,

New York, N. Y. Non-members of associations—J. P. Lally, C. G. Hussey & Co., Pittsburgh, Pa., and H. V. Steinkraus, Bridgeport Brass Co., Bridgeport, Conn.

THE PEOPLE'S COMMISSARIAT for Heavy Industry has approved the building plan for the Pribalkhashski Copper Combinat (combined works), says *Reuter's Trade Service*, quoting continental papers. The new combinat will include a mine yielding 15,000,000 tons of copper ore a year, a dressing station capable of dealing with 42,000 tons of ore a day, a copper smelting works with a yearly production of 100,000 tons of copper, a thermo-electric station of 98,000 kilowatts, a repair and machine shop, a workers' settlement for 46,000 people, and a number of other annexes. Working plans on the lines already approved are now being drawn up.

Lead and Zinc

PRODUCTION from the lead, tin, and zinc products industry in Canada during 1933 was valued at $4,236,751, compared with $3,498,049 in 1932 and $4,137,600 in 1931.

During 1933 a total of 29 firms in Canada were classified to this industry, which includes those concerns that engage chiefly in (a) the manufacture of white metal alloys such as solders, babbitt, and type metals; (b) the manufacture of lead bars, sheets, pipes and fittings, foil, collapsible tubes, metal fasteners, and similar commodities; and (c) the refining of scrap to recover lead, tin and zinc, and other nonferrous metals. These firms reported fixed and working capital at $4,842,077 in 1933. Employment was afforded to a monthly average of 680 people and $765,075 was paid in salaries and wages. For the 12-month period, the materials used in manufacturing cost $2,501,790 and the value added by processing was $1,734,961.

Production of solders amounted to 2,244,210 pounds, valued at $498,362; babbitt metal totaled 1,485,915 pounds, at $320,472; and type and type metal was reported at 2,999,017 pounds, worth $230,576.—*American Metal Market.*

MINE operators refused to take the cut in prices for zinc concentrates offered by the buyers, and hence sales dropped to 2,280 tons, of which very little represented bona fide sales, as a very large portion represented the shipments of the Eagle Picher Company to its own plants and the remainder on contracts. Practically all the sales represented small lots from small mines, and most of the production remained in the bins of the ore producers.

Buyers took occasion to drop the price to $23 for flotation and $24 for coarse mill grades of zinc concentrates. The smelter shipments of the Eagle Picher Company went out on the base of $26 per ton.

PROGRAM

ANNUAL MEETING

THE AMERICAN MINING CONGRESS

Mayflower Hotel, Washington, D. C.

December 13-14-15, 1934

Thursday, December 13

9:00 A. M. REGISTRATION.

10:30 A. M.

Preliminary meeting, members of American Mining Congress for appointment of Nominating Committee for selection of members, Board of Directors.

11:00 A. M. FIRST SESSION.

CHAIRMAN, D. D. MOFFAT, *Vice President, Utah Copper Company*

Appointment, Resolutions Committee.

(1) A REPORT ON THE STATE OF THE INDUSTRY

(Being a statement on the major problems facing the mining industries)

By HOWARD I. YOUNG, *President, The American Mining Congress; President, Amer. Zinc, Lead & Smelting Co.*

(2) THE STEWARDSHIP OF THE AMERICAN MINING CONGRESS

(A statement on the work for the past year)

By J. F. CALLBREATH, *Secretary, The American Mining Congress*

12 NOON LUNCHEON FOR DELEGATES

Under auspices of National Committee on Rehabilitation of U. S. Bureau of Mines.

Thursday, December 13

2:00 P. M. SECOND SESSION

CHAIRMAN: S. L. MATHER, *Vice President, The Cleveland-Cliffs Iron Co.*

A PLATFORM FOR THE MINING INDUSTRY

(The suggestion is made this meeting develop a platform for all mining and the endorsement of all natural resource industries).

(1) COPPER'S VIEWS—A. E. PETERMAN, *Gen. Counsel, Calumet & Hecla Consolidated Copper Co.*

(2) COAL'S PLANK — J. P. WILLIAMS, JR., *Koppers Coal Co.*

(3) LEAD AND ZINC—

(4) GOLD AND SILVER—STANLY A. EASTON, *Bunker Hill & Sullivan M. & C.*

(5) IRON'S VIEW—

(6) ANTHRACITE COAL—C. F. HUBER, *Glen Alden Coal Co.*

GENERAL DISCUSSION

4:00 P. M. SPECIAL MEETING, National Board of Directors.

7:00 P. M. ANNUAL DINNER

Friday, December 14

9:30 A. M. Adjourned meeting, members, American Mining Congress for election of members, Board of Directors.

10:30 A. M. THIRD SESSION

CHAIRMAN: W. J. JENKINS, *President, Consolidated Coal Co. of St. Louis*

Report, Resolutions Committee

IN BEHALF OF MINING

(Progress in Committee Work)

J. B. PUTNAM, *Chairman, Legislative Committee*

EUGENE MCAULIFFE, *Chairman, Bureau of Mines Committee*

H. B. FERNALD, *Chairman, Tax Committee*

E. J. NEWBAKER, *Chairman, Coal Division*

E. A. HAMILTON, *Chairman, Western Division*

GEO. R. DELAMATER, *Chairman, Manufacturers Section*

12 NOON LUNCHEON MEETING

National Legislative Committee

Friday, December 14

2:00 P. M. FOURTH SESSION

CHAIRMAN: D. A. CALLAHAN, *Pres., Callahan Zinc-Lead Co.*

TOPIC:

NEED FOR COOPERATIVE ACTION

CLINTON L. BARDO, *Pres., National Association of Manufacturers*

J. P. WILLIAMS, JR., *Pres., National Coal Association*

OTHO M. GRAVES, *Chairman, Code Authority for Crushed Stone, Sand, Gravel and Slag Industries*

RALPH M. ROOSEVELT, *Pres., American Zinc Institute*

R. C. ALLEN, *Pres., Lake Superior Iron Ore Association*

DR. WILSON COMPTON, *Mgr.-Secy., Natl. Lumber Mfrs. Assn.*

E. J. MEHREN, *Pres., National Portland Cement Association*

Final Report, Resolutions Committee

Final Report on Platform for Mining Industries

Discussion and Adoption

5 P. M. FINAL MEETING, Board of Directors, for election of officers

8 P. M. MEETING, National Tax Committee

Saturday, December 15

10 A. M.

Semi-annual Meeting, Board of Governors, Manufacturers Section, Coal Division

SPECIAL COMMITTEE MEETINGS:

Legislation
Bureau of Mines
Taxation

12 NOON ADJOURNMENT

	Zinc Concentrates			Lead Concentrates		
	This Week	Last Week	Year ago	This Week	Last Week	Year ago
Total Stocks (Sold & Unsold)	16,758	17,769	12,211	15,985	15,967	10,351
Net Reserve Stock	15,443	17,367	11,457	15,985	15,967	10,188
Production (*)	2,656	7,897	6,858	449	949	1,084
Shipments	3,667	6,367	4,157	431	710	694
Sales Reported	4,580	6,015	3,724	431	710	752
(*) Included Tailing Mill Production	393	1,874	1,045			
Base price—Joplin	$25.00	$24.00	$30.00	$33.00	$34.00	$47.50
Metal price—Average for week—						
Zinc, E.St.L., Lead, St.L.	3.747¢	3.750¢	4.500¢	3.437¢	3.462¢	4.150¢

	This week	Last week
Mine mills operated 32 hours or more	11	34
Mine mills operated less than 32 hours	1	1
Tailing mills operated 96 hours or more	6	16
Tailing mills operated less than 96 hours	0	0
Total mills which produced more than 25 tons during week	18	51
Mills which produced less than 25 tons during week	5	6
Total number of mills operated during week	23	57

Mine Mills Operated This Week: Adm No. 2; Byrd & Co.; Crabapple; Dines Wilson; Lost Trail; Lucky OK; Luck Ox; Locklyn; Peru; Mission; Ramage; Redskin; Skelton; UZ Royal; Diamond Joe; Playter.

Tailing Mills Operated This Week: Aul; Byrd & Co.; Interstate Woodchuck; Lucky Jay Hawk; Myers No. 2; Britt; Youngman.—*Tri-State Zinc and Lead Ore Producers Association Bulletin for week ending November* 17, 1934.

THE "Lead Sheet and Pipe Development Council" has been formed, subscribers including 92 percent of British lead manufacturers. Its objects are to apply the findings of research, to provide technical and other information to architects, contractors, etc., and to cooperate with water undertakings and plumbers throughout Britain. Mediums of publicity will be the press and lectures.

The capital of this section of the lead industry is approximately £5,000,000, and it is estimated that a 10 percent increase in the use of lead sheets and pipes in this country would increase employment by 4,000 to 5,000.

Iron and Steel

TWENTY billion dollars, almost twice the total stock of money in the United States today, has been paid out in wages and salaries to steel industry employes since 1901, according to a recent estimate by the American Iron and Steel Institute.

During the same period, the hundreds of thousands of American men and women (there are 550,000 of them today) who, as stockholders, own the steel companies, have received dividends of only $4,000,000,000 on their invested savings.

Steel's bill for its employe welfare work alone since 1901 amounts to more than $500,000,000. This money was spent for direct relief, to improve plant sanitation, to afford better housing conditions for employes and, generally, to make working and living conditions better for its workers.

Accident prevention, a field in which the steel industry was a pioneer, has cost over $50,000,000 since 1901. Returns from this investment have been tremendous, not only in dollars and cents to the industry, but in far greater peace of mind among its employes. Nearly all of the $50,000,000 spent on safety went into safety guards on moving machinery and, in many cases, into the complete redesign of machines and even processes, in addition to intensive educational "safety first" campaigns.

The $20,000,000,000 pay roll does not represent the industry's total payments to labor since 1901. Besides that huge sum, an estimated $3,000,000,000 went directly to workers in other industries for their services on property repairs and new construction enterprises.

Fully 86 percent of the steel workers of the country are standing behind their employe representation plans of collective bargaining, according to the results of an industry-wide survey just completed by the American Iron and Steel Institute.

The Institute's survey, covering a period of one year from July 1, 1933, to June 30, 1934, presents the results of collective bargaining in 35 leading steel companies operating plants in all sections of the country and employing 320,000 workers.

Although the period covered by the survey has been one of turbulence in industrial relations in many industries, employe representation in the steel industry is shown to have settled thousands of cases quietly and in an orderly manner.

That the plans operate to the benefit of employes rather than their employers is indicated by the fact that 71 percent of all cases were settled in favor of the worker.

Of the total number of employes, 86 percent are known to have voted in employe representation plan elections, and thus to have registered satisfaction with this form of collective bargaining.

The survey reveals the employe representation plans as a practical and efficient method of collective bargaining and one that is actively functioning. During the period covered by the survey, 12,709 cases were brought before joint committees of employes and managements. Of these, 8,563 were decided in favor of employes and only 1,965, or 16 percent, in favor of management.

ADDRESSING the Ohio Section at a recent meeting in Columbus, Ohio, R. C. Allen, executive vice president for Oglebay, Norton & Co., Cleveland, spoke on "The Iron-Ore Industry of the Lake Superior Region in Prosperity and Depression."

The speaker considered this region in connection with the problem of national security. This is the age of minerals; progress depends on them; and next to agriculture, the mineral industry is of prime importance. The United States has no shortage of minerals, rather an oversupply; but many mines have been and are being exhausted. The shifting of the sources of supplies of minerals so important as copper, petroleum, and iron to other countries would create internal strains and affect international relations. There will be no early decline of ore mining in the Lake Superior region unless it is forced by unwise public policies. Iron ore is industrial strength and self-sufficiency. A study of economic geography is important for statesmen and mining men, because the minerals essential for peace and war are haphazardly or irregularly distributed throughout the world. Of these minerals, 75 percent are owned by 10 percent of the population, mainly peoples of Anglo-Saxon origin.

The Lake Superior region during the past 20 years has meant more to the United States than any other one resource. Wherever one goes he sees products of that district. It supplied nearly half of the world's iron and steel in the 1920's. Our industrial superiority arises from it. Will it continue to supply the ore needed or will it have to be supplemented by ore from other countries? Shipments of high-grade ore total 1500 million tons and 1400 million tons in measurable reserve remain. Producers feel that something must be done to assure a supply of high-grade ore for the distant future.

In 1929, 161 producers shipped 66 million tons. Nearly all deposits were con-

trolled by ore or furnace interests in 1929, which had $300,000,000 invested in them. Employment was given to 22,000 men who received $30,000,000 as wages and $5,000,000 as salaries. The ore-carrying fleet accounted for 58 percent of all registered tonnage on the Great Lakes and employed 11,000 men whose wages are higher than on any other waters and who were paid nearly $10,000,000. Between the miner and ships are the railroads and docks, devoted almost exclusively to this business. These have respective capital investments of $45,000,000 and $70,000,000. The whole iron and steel industry represents an investment of $5,000,000,000, of which $4,000,000,000 is in plants and facilities depending on Lake Superior iron ore.

As the result of the depression many ore properties were dropped. However, nearly every company that operated during 1929 is again doing so or is in position to work.

For many years a study has been made of the ore reserves, with new estimates each year by the three states—Minnesota, Wisconsin, Michigan—showing that developments and discoveries do not equal shipments. The region is working on diminishing measurable reserve, but undoubtedly some ore will be discovered. If there be a return of shipments to near 55 million tons a year as in the 1920's, the ore in measurable reserve will not last much more than a generation. How is the supply to be continued without importations?

There is plenty of iron-bearing material, but processes must be devised to make it suitable for blast furnaces. On this the experiment stations at Minneapolis, Houghton, and Battelle have done and are doing valuable work. However, so far, no method is known by which to concentrate the average Lake Superior type of formation and to supply ore to furnaces at a cost competitive with the present price of domestic ore. The price of the domestic ore will need to be $1 to $1.50 per ton higher to bring out a large volume of these concentrates. At higher prices it would be cheaper to bring ore from Brazil and other countries into the markets now supplied from Lake Superior.

Politics and economics largely enter the whole problem. In Minnesota there is discriminatory taxation and a strong feeling that the people should own the ore supplies. The shipping and ore interests are opposed to the proposed St. Lawrence waterway or canal because it would let in foreign ore to the Great Lakes below the present price of Lake Superior ore. If the Lake Superior region shall continue to supply furnaces with ore permanently it must be relieved of discriminatory taxation and not be subject to the imposition of other hindrances such as free passage of ocean freighters to Lake ports.—*From Mining and Metallurgy.*

GET HIM THIS TIME, HE MIGHT NOT COME UP AGAIN

—The Evening Star

FACTORS enhancing the outlook for mining men are contained in the very definite attitude of the Administration toward national defense. Negotiations now going on in London over the naval treaty have already indicated the firmest stand taken in many years by this Nation. Recent announcement of budgetary approval of huge additional allotments for navy building and even greater grants expected for aviation and the army presage activity in many lines in which metal products are important factors.

The import of scrap steel and iron by various countries, particularly Japan, a party in the naval treaty hearings, is thus pertinent. A recent report by the Commerce Department in this regard is illuminating.

"More iron and steel scrap was exported from the United States during the first nine months of 1934 than ever before left the country during a period of similar duration or, for that matter, during any past calendar year. The 1934 total, 1,275,414 gross tons, was more than two and one-half times as great as the corresponding figure for 1933 and was eight times as large as that of 1932.

"Japan was the largest purchaser of iron and steel scrap during the current year—her total of 779,334 tons accounting for 61 percent of all the scrap exported in 1934. Following was Italy, with a total of 158,245 tons; Poland with 99,826 tons; the United Kingdom with 87,143 tons, Canada with 40,828 tons, China with 21,389 tons, and Belgium with 18,730 tons—these seven countries combining to take approximately 95 percent of the total shipped, official statistics show.

"With the exception of the 21,389 tons consigned to China and the small part of the total made up by tin plate scrap and waste-waste tin plate, the tonnage shipped was made up of heavy scrap destined for melting in the steel furnaces of the country to which it was consigned, it was stated."

GERMANY'S import trade in iron ore has been markedly hampered as a result of the official control under which it has been placed, according to the Commerce Department.

This trade, it is pointed out, is now under the supervision of the Government's iron and steel control office. A definitive system of control has not as yet been worked out, but the control office is stated to be treating each case separately. Whenever it is desired to import ore it is necessary to obtain permission therefor, or no foreign exchange will be available for its payment.

STEEL INDUSTRY AT A GLANCE

	Current	June, 1933
Employes (August, 1934)	404,793	338,146
Payrolls (August, 1934)	$34,362,208	$30,560,761
Average Hours Worked per Week (August, 1934)	26.5	39.7
Average Earnings per Hour, all employes (August, 1934)	72.2¢	53.0¢
Percent of Operating capacity (September, 1934)	22.74%	45.37%
Steel Ingot Production, Gross Tons (September, 1934)	1,251,630	2,564,420
Composite Price of Steel (September, 1934)	$32.15	$28.73

Coal

OF PARTICULAR interest to coal operators is the approval of an amendment by the NIR Board to the bituminous code, providing for effective means of gathering statistical data; basis for contributions for the Utah coal budget; present consideration of the Seattle retail solid fuel industry; denial by the Industrial Appeals Board of an appeal by the cotton textile mills from the retail fuel industry code.

The amended section calls for the establishment of "statistical bureaus" under the industry's Divisional or Subdivisional Code Authorities. Each bureau will be under the direction of a "managing director," who may be the secretary of the Code Authority but who shall not be an officer, director, or employe of any producer.

Presidential members of the Code Authorities are empowered to inspect books and records and require reports from producers against whom complaints of violations have been filed.

All producers are required to report

all "spot orders" to their respective bureaus as well as to furnish copies of sales contracts, invoices, credit memoranda and "such other information concerning the production and sale of coal as such Code Authority, with the approval of its Presidential member, may require."

The filing of inaccurate reports or the failure to file the required reports will be a violation of the code.

The amendment just approved is expected to "overcome the existing inadequate provision" in the code covering the compilation of statistical information, a report to the Board said.

Each statistical bureau, when directed by its Code Authority, is to compile information on coal sales and distribution "in such manner as shall not be prejudicial to the interests of any producer." Original records and information are to be held in confidence and protected from misuse in accordance with the code.

THERE has been some interesting talk that the Government may come to an agreement with labor to reduce wages and general cost of governmental construction. Serious thinkers have indicated that as long as Federal projects offer more lucrative wages to labor than private industry, private building will lag. It is said that this is one of the features that has held back the housing program, although the latter has made significant strides. A tentative two-year agreement with labor in which wages on projects where Government funds are employed would be lowered 10 percent the first year and upped back the 10 percent the second year with a definite agreement on no labor difficulties for the period might be sought. Private industry would then be able to enter the building field, pay slightly higher than the governmental rates, and still afford to build, it has been stated. Opponents of this proposal, however, see in it a turn-about of previous Administration policies of high wages and shorter hours.

THE FULL report of the special NRA Committee to study the industrial store scrip question follows:

"Limited acceptance of scrip, at not less than its par or face value, has been recommended as a fair trade practice for all types of retail outlets by a special committee appointed under the retail code to investigate so-called "company" stores and the scrip system of wage payments.

"The committee, which was named by the National Recovery Administration on March 16, 1934, limited its study to company stores found in the mining, quarrying, lumbering, railroading and manufacturing industries. It excluded from its investigations which were carried on under the direction of the NRA Division of Research and Planning, plantation stores, Government commissaries and such non-profit organizations as self-help barter exchanges, as well as scrip issued by financially distressed municipalities. The committee was composed of Dr. C. B. Fowler, Professor of Economics, City College of N. Y.; Dr. Henry Post Dutton, Professor of Factory Management, Northwestrn University; and Daniel Bloomfield, Executive Secretary, Boston Retail Trade Board.

"No action has been taken by the National Industrial Recovery Board on the report. In submitting its report, the committee pointed out that "the effective correction of such evils as exist cannot be fully achieved under the retail code." An attempt at such correction had been made by code proponents through the provisions of Article IX, Section 4, which were stayed until December 1, 1934, pending the present committee's report. The stayed provisions prohibited any retailer from accepting as payment for merchandise "any non-negotiable scrip, company checks, or other evidence of wage payment issued by any individual or private profit organization in payment of wages or as an advance upon unearned wages." Retailers also were prohibited from extending credit in the form of goods, money or services "upon any employer's guarantee of part or all of said person's future wages . . . unless an identical guarantee . . . is available to all retailer's."

WHAT THE NEXT CONGRESS WILL DECIDE

—Chicago Tribune

"In its report, the special committee submitted two groups of recommendations. The first group which relates specifically to Article IX, Section 4 of the retail code as approved on October 21, 1933, would eliminate that Article and substitute for the following provisions:

"No company store or retail store shall collect by offset in the form of scrip, book credit or otherwise, against the wages of any person other than its own employes engaged exclusively in the retail trade, an amount for merchandise sold by said store in excess of 25 percent of such pay earned in any pay period.

"No store shall purchase or receive or accept for cash or consideration in trade or in payment of indebtedness any scrip at less than its par or face value."

"The committee's second group of recommendations is 'designed to carry out the spirit of the first group,' which would apply only to the retail trade, and to 'indicate some considerations involved in correcting some of the evils which now exist in connection with the company store and scrip system'."

"These supplemental suggestions include the adoption of regulations which would:

"(1) Insure that the worker receive a reasonable portion of his wages in cash on each pay day;

"(2) Limit the pay period to one week, and limit pay hold-backs to a maximum of one week;

"(3) Prohibit any employer of labor from requiring an employe to trade at the company store; and

"(4) Prohibit the payment of wages due in any form other than lawful money or par checks.

"In its report the committee states that the present Article IX, Section 4 of the retail code, as well as an identical provision in other codes, 'recognizes the interest of the independent merchant'; and that, outside of a group of merchants in Birmingham, Ala., the committee 'found little evidence of an organized or a widespread protest' against its provisions.

"Likewise, the committee found 'but few cases of direct and indirect pressure being exerted on the employes to trade at the company store,' which stores 'sell goods and render services equal in quality compared to those offered by the independent stores.'

"However, the committee reported that 'food prices in the company store are on the average from 2.1 percent to 10.4 percent higher than similar prices in neighboring independent stores;' and that 'the practice of discounting scrip for cash by merchants and other members of the community is widespread.' The rate of such discount was reported to vary from 10 to 30 percent.

"In conducting its field investigation, the committee reported, detailed inquiries were made into the conditions which prevail in the ten eastern states in which company stores are most numerous and the use of scrip as a form of wage payment most common. An individual questionnaire and complete information on policies and prices were compiled for 150 commissaries and 100 neighboring independent stores. An additional 35 commissaries were selected at random to verify the representative character of those from which more detailed data were compiled subsequently. Commissary and independent store managers, labor leaders and the laborers themselves were interviewed in all communities visited by the investigators.

"The question as to the effect of the

use of credit upon the freedom of labor was given 'special consideration' in its study, the committee reported. Some cases of compulsion or intimidation were found, 'but these were exceptional.' However, the report states: 'The necessities of an impoverished or improvident employe may be as effective as coercion would be in causing him to trade at the company store, where alone he can secure an advance against his pay.'

"In some instances, the committee found, 'commissary managers explained that a number of laborers were in perpetual debt to the commissary'; and in one South Carolina plant 'it was claimed by the laborers that there were three workers who had not received any cash in the last fifteen years.' Another case was encountered in West Virginia where 'the company had not even gone through the formalities of having a cash pay day in the last two years.'

"Many of those who operate company stores, the committee reported, believe large numbers of the unskilled classes of employes are unable effectively to order their own affairs, and that the close supervision and control of credit exercised by the company store 'serve to prevent the impulsive or foolish squandering of the worker's wages.' In reply to this contention, the report declares:

"The assumption of a paternalistic responsibility carries with it, however, certain implications, among which, in the judgment of this Committee, is a responsibility to see that the employe who confides in this responsibility, receives treatment at least equal to what he would receive from those professing no such restraining relationship.

"There is room also for question as to the social desirability of extending a paternalistic relationship beyond the minimums unavoidable in the situation. The system of credit tends toward a minute supervision over the economic affairs of the employe. The employe who surrenders the management of his affairs to the employer is denied to that extent responsibility which educates him in self-reliance and economic competence."

Appended to the report are 18 tables of exhaustive data dealing with retail prices of foods in company and independent stores in various localities, and classifications of the activities and locations of reporting stores.

SEVERAL circumstances indicate that either definite interpretation of the disputed 7(a) section will be made before long through legal action or that legislation to clarify the situation will be enacted by the coming Congress. Both are probably in the picture.

Orders of the Labor Board for the holding of collective bargaining elections at rubber plants in Ohio; the announcement by Chairman Francis Biddle that he has secured the promise of the Justice Department for speedy action on the Houde case in court; and the breakdown in steel-labor negotiations with the possibility that a collective bargaining election will be ordered with resultant refusal and court action; all presage activity in this disputed field.

BUT WHICH WAY IS HE COMING?

—The Washington Daily News

Chairman Biddle's announcement is possibly the most important from the standpoint of both immediacy of action and being indicative of the line of action the new chairman intends to follow. There is some evidence that the Administration would not be adverse to a court decision which would once and for all clarify the 7(a) section which has caused the principal difficulty between industry and labor.

It is possible that should the Houde case get into court, the Steel Labor Board would defer action in ordering elections in steel plants, pending the outcome.

Meanwhile there is good evidence that new legislation will be framed on this disputed point. Many feel that the passage of the labor resolution as a substitute for the Wagner bill in the closing minutes of the last Congress was hasty and not carefully enough considered. Based on the experience gained since last June under 7(a) and the operations of the National Labor Relations Board, the new legislation could well be permanent in character. It is important to note that there is a definite feeling favorable to the Labor Board set-up, together with wide extension of its subsidiaries. This may well form an important part of any new legislation in this field.

In the interim the very existence of the Board is threatened should the steel companies maintain their present position and challenge the validity of a Labor Board ruling that an election be held in designated plants. It is thought likely that the legislation to be framed will attempt to remove controversial features.

Dr. A. Howard Myers has been named executive director of the NRA Labor Advisory Board. He succeeds Dr. Gustav Peck, who resigned to become assistant to the administrative officer on employment problems. The new director is a Cornell graduate with M.A. and Ph.D. degrees from Columbia. He was in the economic department at Cornell and served on the research staff of the New York State Department of Social Welfare and Department of Labor. He came to the Labor Advisory Board in June, 1933, and has served as chief of staff for some time.

A COAL cutting machine subdivision and a coal mine loading machine subdivision have been set up under the code for the machinery and allied products industry by approval of two amendments by the National Industrial Recovery Board, the NRA announced recently. The amendments defining the two subdivisions, which will be known as Paragraphs 48 and 49 of Article II of the approved code, follow:

"Coal mine loading subdivision means the manufacturing and/or assembling for sale and selling by the manufacturer and/or assembler, for use in loading coal or other material underground in coal mines, mobile types of loading machines; including spare, repair and replacement parts thereof and supplies and/or equipment incident thereto when manufactured and/or sold by a manufacturer of such mobile types of loading machines."

"Coal cutting machine subdivision means the manufacturing and/or assembling for sale and selling by the manufacturer and/or assembler, of coal cutting machines most commonly used underground in coal mines, but which may be used in the production of other minerals such as rock salt, potash, and gypsum. Including in the manufacturing and/or assembling for sale and selling of coal cutting machines are spare, repair and replacement parts thereof and supplies and/or equipment incident thereto when manufactured and/or sold by a manufacturer of such coal cutting machines."

BITUMINOUS coal production moved slightly upward for the week ended December 10 from the previous week, reaching 7,335,000 tons as compared with the 7,320,000 total of the preceding week. The new total represents a substantial increase over the past few weeks and is a seasonal rise, according to Bureau of Mines figures.

Pennsylvania anthracite production again jumped upward after slump of the week ended December 3, rising from 878,000 tons to 1,033,000. The latter figure is still 150,000 tons short of the October 27 total.

CALLING attention to the fact that lowest reasonable cost computations are not minimum cost, the special NRA Committee announced approval of lowest costs for handling coal at retail in the Cleveland area and in eight Maryland counties.

The cost figures represent only the committee-determined lowest reasonable cost of the actual handling of coal by

retail dealers. As broken down by the Committee, they include yard, selling, delivery and administrative costs, plus degradation. They do not include any element of profit or return on capital investment.

Approved schedules for the Maryland counties for handling coal trucked from mine to consumer include Washington $3.30 a ton; Frederick $3.80 a ton; Kent $4.80; Dorchester and Wicomico $6.15; Carroll $4; Cecil $4.55; Anne Arundel $5.30. (To obtain minimum retail prices of trucked coal permissible under the schedules, these figures must be added to mine costs only).

In the Cleveland area a schedule of $2.35 a ton for domestic customers; $1.35 for commercial customers; $1.10 for industrial customers; and $1.75 a ton for relief coal has been set and to which the following service charges must be added: 35 cents a ton for wheeling in; 50 cents a ton for carrying into bins; 15 cents a ton for trimming in bins; 15 cents a ton for credit terms on steam coal; 25 cents a ton for credit on domestic coal sales.

THE TOTAL production of anthracite (which includes colliery fuel) for the week ending November 10, as estimated by the United States Bureau of Mines, Department of the Interior, Washington, D. C., amounted to 1,033,000 net tons. This is an increase, as compared with production of the preceding week, of 155,000 net tons, or 17.7 percent. Production during the corresponding week in 1933 amounted to 849,000 tons.

ESTIMATED PRODUCTION OF ANTHRACITE (Net Tons)

	1934		1933	
	Week	Daily Average	Week	Daily Average
October 27	1,187,000	197,800	1,073,000	178,800
November 3	878,000	175,600	726,000	145,200
November 10	1,033,000	172,200	849,000	169,800
Cal. Yr. to Nov. 10, 1934	49,989,000		Coal Yr. to Nov. 10, 1934	31,494,000
Corres. period, 1933	41,549,000		Corres. period, 1933	28,892,000
Increase 8,440,000 tons, or 20.3 percent.			Increase 2,602,000 tons, or 9.01 percent.	

ACCORDING to a recent report of the Bureau of Foreign and Domestic Commerce, Washington, D. C., there were received at the Port of Boston during the week ended November 3, 1934, 5,719 net tons of anthracite from Wales, and 6,964 net tons from Russia.

MORE ADEQUATE and current information will be available to American business men because of a reorganization of the Marketing Research and Service Division of the Bureau of Foreign and Domestic Commerce, says Claudius T. Murchison, director, who points out that the improved service is for the benefit of retailers, wholesalers, manufacturers, and all other agencies engaged in the distribution of commodities. The actual reorganization is based on the recommendations of the recent report of the Committee on the Elimination of Waste in Distribution of the Business Advisory and Planning Council, which recommendations will be followed as closely as the present funds and personnel will permit, he added.

ACCORDING TO the "Monthly Labor Review" published by the Bureau of Labor Statistics of the United States Department of Labor, the average hourly earnings of the anthracite mine workers in April of this year were 81.1 cents. The next highest hourly earnings in non-manufacturing industries were 75.2 cents in electric light and power and manufactured gas industry. The hourly earnings for all of the non-manufacturing industries included in the report were as follows:

	Cents
Coal mining:	
Anthracite	81.1
Bituminous	68.5
Metalliferous mining	55.2
Quarrying and nonmetallic mining	46.9
Crude-petroleum producing	69.8
Public utilities:	
Telephone and telegraph	70.0
Electric light & power & manuf'd gas	75.2
Electric railroad and motor bus operation and maintenance	59.3
Trade:	
Wholesale	62.3
Retail	50.9
Hotels (cash payments only)*	27.2
Laundries	38.0
Dyeing and cleaning	60.5
Banks, brokerage, insurance, real estate	†

* The additional value of board, room, and tips cannot be computed.
† Not available.

The average hourly earnings for all manufacturing industries, 87 in all, were 54.1 cents, ranging from a low of 26.5 cents for workers in the cottonseed-oil, cake and meal industry to 74.4 cents in the manufacture of beverages.

AS WORK PROGRESSES on the Boulder Dam, Ingersoll-Rand Company—manufacturers and suppliers of much of the air-compressing and rock-drilling equipment—has issued booklets covering the progress of the vast undertaking.

The present booklet (Volume 4) contains descriptions of the cofferdams; the aerial cableways; and the tunnels for the penstock headers, the penstocks, and the canyon wall outlets. It also tells of the method of pouring the concrete, and how the concrete is cooled while being poured.

Free copies of Volume 4 are available upon request at the company's main office, 11 Broadway, N. Y., or at any branch office.

BOOK REVIEW

Transactions of the Coal Division of the American Institute of Mining and Metallurgical Engineers; Volume 108. *Published by the Institute, New York City, pp.* 495.

Transactions of the Coal Division of the American Institute of Mining and Metallurgical Engineers are set forth in a volume—the fourth of its type—which has been issued.

This volume includes papers that were presented before meetings held in 1932 and 1933 at Hazleton, Pa., and Columbus, Ohio, and also papers presented at the annual meetings of the Institute and the Coal Division in New York.

Studies pertaining to classification of coal are the source of much of the subject matter contained in the 495-page book, with other sections being devoted to the general topics of Mining, Preparation, Classification, Evaluation of Coal for Coke, Utilization, Coal Lands Valuation, and Economics.

The presentation includes the text of more than 30 papers and 2 committee reports.

In the foreword, Eli T. Connor, chairman of the Institute's Coal Division, points to the importance attached to classification of coal through the preparation and inauguration of coal codes under NRA. Fifteen papers relating to classification of coal are included in the volume.

Following the text of each paper is a transcript of related discussion.

The volume is well-printed and includes a well-prepared index. Charts, graphs, and clearly-reproduced photographs comprise the illustrative material and serve well to supplement the informative textual content.

Slowly Recovering

A Loyal Democrat's Adventures in U. S. Alphabetical Government, **by Winston Norman.** *Published by John Day and Co., New York. Price,* 98 *cents.*

CHARACTERIZED as the most amusing book of the year, "I Think I Am Slowly Recovering" has just made its appearance in the bookstores of the United States and Canada.

It provides an hour's continuous laugh for those who have some understanding of the jumble of alphabetical bureaus now directing the recovery program in the United States.

A plasterer, out of work—but always a loyal Democrat—blindly devoted to the New Deal, takes his pen in hand to get his share of the good things going. Through the whole runs a pathetic streak that adds depth to the delicate irony of the story.

Young Norman, the elder son of Sidney Norman, well known mining writer, was born at Pasadena, Calif., 26 years ago and educated in the public schools of Spokane.

Later he attended Stanford University, in California, and graduated with highest honors.

PERSONALS

A. C. Fieldner has been elected junior vice president of the American Society for Testing Materials. Mr. Fieldner is chief engineer of the Experiment Stations Division, U. S. Bureau of Mines, is a member of several A. S. T. M. committees and has been chairman of Committee D-5 on Coal and Coke since 1920.

Charles H. Segerstrom, President of the Carson Hill Gold Mining Corp., Sonora, Calif., in his annual report of October 15, shows assets of over eight million dollars and an earned surplus of $237,683.99.

A. J. McDermid, mining engineer, formerly with Miami Copper Company, Miami, Ariz., has been appointed junior assayer for the United States government mint in New York City.

R. W. Higgins, President of the Consolidated Coppermines Corporation, is in Kimberly, Nev., inspecting their copper properties there. He is accompanied by other officials and directors of the company.

C. J. Sandoe, President of the West Virginia Coal Company of St. Louis, was elected president of the Illinois Mining Institute at its Forty-Second Annual Meeting, held in Springfield, Ill., early in November.

C. F. Hosford, Chairman of the Bituminous Coal Code Authority at Pittsburgh, is one of the two coal men elected to the executive committee of the recently formed Council of Code Authorities and Trade Associations of Western Pennsylvania. The other is R. W. Kiser, chairman of the Retail Solid Fuel Industry.

J. William Wetter

J. William Wetter, general manager of Madeira, Hill & Co., Phillipsburg, Pa., is now in charge of both the anthracite and bituminous operations of his company.

Samuel H. Dolbear, consulting mining engineer, New York, has been on a six weeks' trip to South Dakota and Mexico.

George A. Guess, professor of metallurgy at the University of Toronto, has just returned from a trip around the world.

Frederick M. Becket has been elected an honorary member of the Electrochemical Society.

Coal Mining Institute of America, announces through its Secretary-Treasurer **G. W. Grove**, that its annual meeting will be held December 5 and 6 at Pittsburgh, Pa.

O. L. Alexander, president, Pocahontas Fuel Company, Inc., and **Charles O'Neill**, vice president, Peale, Peacock and Kerr, Inc., have been reappointed on the Special Legislative Committee of the National Coal Association.

H. D. Everett, formerly vice president and general manager of the Smokeless Fuel Company, has been elected president to fill the vacancy caused by the death of its former president, Justus Collins.

H. Foster Bain, after three years' service as managing director of the Copper and Brass Research Association, is retiring from that post the first of December. He may be reached after that time at 93 Jane St., Hartsdale, N. Y.

H. Foster Bain

Charles E. Bockus, president, Clinchfield Coal Company, and former president of the National Coal Association, has been appointed by the U. S. Chamber of Commerce to cooperate with the administration in plans for business recovery.

L. E. Woods, president, Crystal Block Coal Company, was reelected president of the Operators Association of Williamson Field, at the twenty-second annual meeting, held in Williamson, W. Va., the first week in November.

John T. Ryan, Jr., son of John T. Ryan, of the Mine Safety Appliances Company, Pittsburgh, has enrolled in the School of Business Administration of Harvard University. He graduated from Pennsylvania State College last June with highest honors in a class of approximately 800.

OBITUARY

Rembrandt Peale, President of Peale, Peacock and Kerr, died on Monday, November 12, at his home in New York City. Mr. Peale was seventy-six years old.

Charles E. Lawrence, of Caspian, Mich., died November 10, at the age of 69. Mr. Lawrence was the retired general superintendent on the Menominee iron range of Michigan for Pickands, Mather & Company.

W. J. Jenkins, President of the Consolidated Coal Company of St. Louis, has been in Washington attending the meeting of the Legislative Committee of the National Coal Association, and conferring with officers of The American Mining Congress.

E. D. Stokes, Jr., who is interested in California gold properties, was an eastern visitor during the month of November.

Visitors at The American Mining Congress headquarters in Washington during the month of November include **Emil Richter**, treasurer and assistant secretary, Howe Sound Company; **Howard I. Young**, president of the American Zinc, Lead and Smelting Company; **H. B. Fernald**, of the firm of Loomis, Suffern & Fernald; **Dr. John R. Turner**, president, University of West Virginia; **Cleveland Dodge**, vice president, Phelps Dodge Corp., and **E. J. Newbaker**, vice president and general manager, Berwind White Coal Mining Company.

James MacNaughton, president and general manager of the Calumet and Hecla Consolidated Copper Company at Calumet, Mich., has been awarded the Saunders gold medal for outstanding achievements in mining. The award was made by the board of directors of the American Institute of Mining and Metallurgical Engineers, following the unanimous choice by an Institute committee of 17 members.

The Saunders award was instituted as an annual custom by the late William Lawrence Saunders, engineer and president of the American Institute.

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Many persons gauge the hardness of dynamite and the plasticity of gelatin with the thumb. Hercules measures these qualities with specially designed apparatus... Each grade of explosive requires a definite degree of hardness or a certain plasticity for best blasting results. These "just-right" standards are followed in all Hercules plants... It is attention to details such as these that makes Hercules explosives so uniformly dependable.

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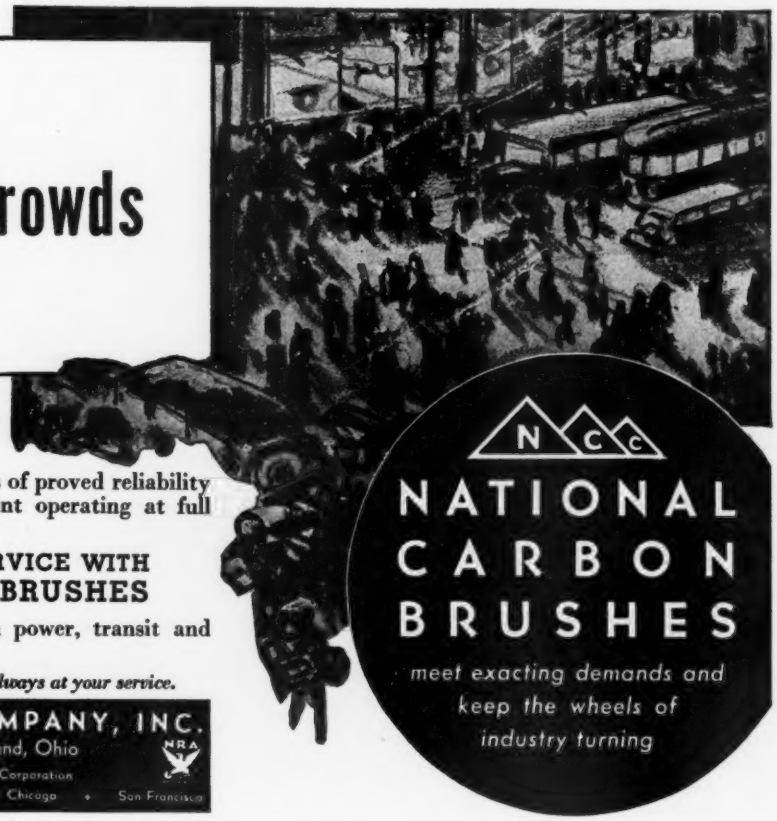

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NEWS OF MANUFACTURERS

INGERSOLL-RAND COMPANY has recently issued a catalog describing its stationary-type Diesel engine. This unit is of the 4-cycle, single-acting, solid-injection type. It has a box-type housing, cylinder liners, and an overhead chain-driven camshaft, and is fully inclosed and provided with automatic lubrication throughout.

The I-R Diesel engine is built in sizes ranging from 175 to 1,500 bph. and is applicable for direct-connected alternating-current generator drive, gearing to pumps, direct connection to compressors, for belting to line shafting, and for similar work.

A copy can be obtained from Ingersoll-Rand Company, 11 Broadway, New York City, or any branch office.

UNDER THE NAME of Duro-Brace Texsteel Sheave, the Texrope Division of the Allis-Chalmers Mfg. Co., is introducing a new reinforced steel sheave.

The outside walls of sheaves sometimes bend under the strain of excessive overloads, with the result that they are thrown off true. The outside walls of the new Duro-Brace sheaves are reinforced by a convex steel plate, which strengthens these vulnerable areas to so great a degree as to practically eliminate the possibility of distortion, irrespective of the strains to which they are subjected.

Welding at the rim and web, for additional strength, and the interior grid-type construction, for rigidity, which were advantageous features of the former design are retained in the new Duro-Brace Texsteel Sheave.

THE FOLLOWING changes in organization in the Explosives Department, Hercules Powder Company, to become effective January 1, 1935, have been announced by C. A. Bigelow, general manager of the department.

John K. McCabe, now assistant manager of the San Francisco office, has been made an assistant director of sales with offices in Wilmington, Del.

J. B. Johnson, for the past five years superintendent at Hercules, Calif., has been named to succeed Mr. McCabe as assistant manager of the San Francisco office.

A NEW eight page bulletin has just been issued by Sullivan Machinery Company on its One-Man No. 6 Prospecting Core Drill. This machine, suitable for either surface or underground prospecting, takes a 7/8-inch core to 250 ft. and one man can handle it. It uses standard "E" rods and "EX" fittings.

THE PORTABLE LAMP AND EQUIPMENT COMPANY, 405 Penn Avenue, Pittsburgh, Pa., manufacturers and distributors of safety equipment for the mining industry, of which George C. Nelms is president, recently issued their new No. 34 Catalog, copies being available on request.

The catalog, which is well illustrated, contains a complete line of protective safety wearing apapparel for the miner, including Cool caps and hats, spectacle type and wire screen goggles, kneel pads, safety shoes, etc.

THE COMPARATIVE operating figures for the third quarter and first nine months of 1934 and 1933, released by the Westinghouse Electric & Manufacturing Company are as follows:

Orders received during the nine months ended September 30, 1934, totaled $79,105,881, compared with $52,953,482 in the corresponding period of 1933; an increase of 49.4 percent.

Sales billed totaled $69,245,486 compared with $46,562,269 in the first nine months of 1933.

Operations during the nine months ended September 30, 1934, resulted in a loss of $363,787. This compared with a net loss of $7,083,641 for the corresponding nine months of 1933.

According to the statement of operations orders booked by the Company mounted steadily in volume during the first half of the current year and in spite of a summer decline the business booked in the nine months' period was notably larger than for the same period last year.

"That the large operation losses of 1932 and 1933," continues the report, "have been in such great measure eliminated this year is a promise of the improvement in earnings that may result from a really substantial and permanent increase in business.

"Periods of hesitancy and recession must be looked for while many of the economic problems have still to be settled; but there are many signs of improvement in business sentiment and activity. We are encouraged by the improvement shown since 1932 in company operations."

ANNOUNCEMENT is made by Link-Belt Company, of Chicago, of the purchase of the physical assets of the Bailey-Burruss Manufacturing Company, 1116 Murphy Avenue, Atlanta, Ga. All divisions of Link-Belt's Atlanta sales office, heretofore located in the Haas-Howell Building, are being moved to the Bailey-Burruss plant, which will henceforth be known as the Atlanta Plant of Link-Belt Company.

The new combined operations will be headed by Mr. I. H. Barbee, a Link-Belt engineer of long experience, who is being transferred from the Philadelphia plant of the company.

AT A MEETING of the Board of Directors of The Timken Roller Bearing Company on October 30, L. M. Klinedinst was elected to the Board and also promoted to the office of vice president in charge of sales to fill the vacancy created by the recent resignation of Judd W. Spray. Mr. Spray plans to spend the winter in Florida and rest indefinitely before announcing his future plans.

T. V. Buckwalter, who has been vice president of The Timken Roller Bearing Company for several years, was elected vice president and director of The Timken Steel & Tube Company.

TO MEET THE DEMAND for a one-piece pintype insulator equivalent in size and electrical values of comparable insulators normally used on transmission lines of from 22 to 46 kv, the Ohio Brass Company, Mansfield, Ohio, has recently announced a line of three O-B Uni-part insulators. These insulators are equivalent to O-B Multi-part insulators Nos. 31546, 31622, and 31623.

These insulators, says the manufacturer, are exceptionally rugged and are especially adapted for use on line locations where insulator replacements are heavy because of breakage due to shootings, stone-throwing, or from other mechanical impacts.

TWO illustrated booklets on "Caterpillar" Diesel Power Units and an interesting booklet entitled "Big Little Things" have been released. Write this magazine or the Caterpillar Tractor Co. at Peoria, Ill., for copies.

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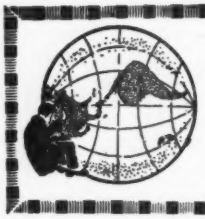

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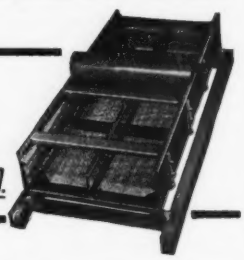

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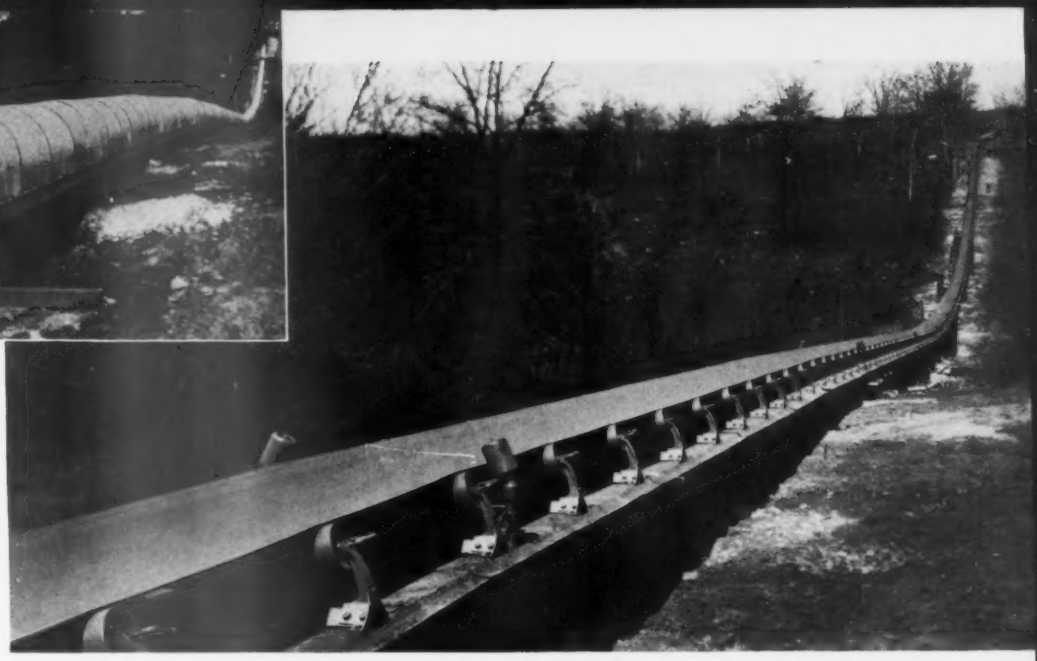

Large view shows a 1803 ft. centers Jeffrey Belt Conveyor used for handling coal from mine to railroad cars. Smaller view shows the same conveyor with its protective covering of galvanized iron.

From Face to R. R. Cars via JEFFREY

Reliance Belt Idlers

Illustration above shows a Jeffrey Belt Conveyor, 1803 ft. centers, used by the Penn-Anthracite Mining Company to convey 12" maximum lump anthracite coal to railroad cars. A 785 ft. Jeffrey Belt Conveyor receives the coal in the slope mine entry, conveys on a 15° incline, discharging into a Jeffrey Hopper, thence through a Jeffrey Feeder to the receiving end of the long belt Conveyor. Both conveyors handle 250 tons per hour.

Similar installations of Jeffrey Belt Conveyors for handling coal have been made for other large coal companies.

The popularity of Jeffrey Belt Conveyors as carriers of both bituminous and anthracite coal . . . from face to cars . . . is indicative of the satisfactory and economical service afforded by Jeffrey Reliance Belt Idlers.

Long experience in designing and manufacturing belt conveyors for handling all kinds of bulk material has enabled Jeffrey to build into the Reliance Idler every feature essential to provide belt protection, long, reliable service and power economy.

Jeffrey Reliance Idlers are available in three types: Troughing, Picking Belt and Flat Belt with three styles of return hangers. Furnished with 4", 5" or 6" diameter rolls for belt widths up to 60".

A close scrutiny of the magnified section (below) and a careful study of its many outstanding features will readily show you why the Jeffrey Reliance Belt Idler is rapidly becoming the preference of industry in solving coal handling problems. Study these Reliance Idler features:

Heavy steel end, electric welded to tube
Outer shells of the rolls are high quality steel tubing
Double Labyrinth grease seal Alemite fittings
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M.S.A. SKULLGARDS are the thing in head protection. Head injuries account for the majority of compensable accidents and deaths in mining,—start your safety program there. Skullgards really **protect**—and they're durable, non-conductive, non-softening from water or perspiration, cool, light and comfortable as an old felt hat. Available in seven reasonably-priced hat and cap types, and in all sizes, to meet every possible mining need.

M.S.A. MINER'S GOGGLES,—Efficient protection for mankinds' greatest treasure and most vulnerable point, the eyes. Eye injuries in mining are both frequent and costly, due to the high rate of disability. Protect **your** men with M.S.A. Goggles, equipped with clear-vision, armorplate safety glass lenses, and available in types to meet every requirement.

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